Crouzet
AUTOMATISMES

NTR 738 A/E

MILLENIUM

A Simple Automation Control Module, with “precision” programming.

Library of Applications.

A set of varied examples originating from the most common applications (commercial sector) to the most advanced (the industrial sphere).

CONTENTS

CAUTION :

The programs contained in this document are given only as examples, and under no circumstances can Crouzet Automatismes accept any responsibility.

Example 1 : Internal/external lighting for a private house.
(File : **ecl-niv1** and **ecl-niv2**)

Specification :

A private individual wishes to equip himself with an installation capable of controlling, by itself, the lighting of a stairwell and an external entrance giving access to the house.
Internal lighting : Two push-buttons are placed in the stairwell ; one in the entrance hall, the other at the top of the stairs. Their function is identical.

- Timed lighting (for 2 minutes) is brought about by brief pressure on one of the buttons. The timer can be inhibited by operating one of them again.
- Permanent lighting is activated if a button is kept pressed for at least 2 seconds. It is stopped by brief pressure.

External lighting : The circuit is made active every year from 1st June to 1st October, and at night using a light-sensitive switch. A sensor detects anyone passing and activates the external lighting for 2 minutes.

Input/output table :

INPUTS		OUTPUTS	
I01	Push-button	**O01**	Internal lighting
I02	Push-button	**O02**	External lighting
I03	Passage detector		
I04	Light-sensitive switch		

Model required :

4 input/2 output Millenium:
MAS-6-RCA (100-240 VAC).

Program description:

The programming can be performed in two levels.
Level 1 : Program satisfying the specification.
Level 2 : Addition of a man/machine interface. Once the program is started, and under certain conditions, the display is as follows :

- Activation of the internal or external lighting.

```
Lighting

Int : 29.3   Current time in
Ext : 53.5   seconds
```

Display of the time delays in real time.

- Activation of the permanent lighting.

```
Lighting

Int : ON
Ext : 53.5
```

- Pressing the Millenium " ◂ " key.

```
**********
External
lamp test
**********
```

The external lighting can be tested at any time. The associated time delay is set at 1 minute.

- Pressing the Millenium " ▸ " key.

```
**Timer**
 Setting
Int : 120.0
Ext : 120.0
```

- Press OK to make one of the presets flash.

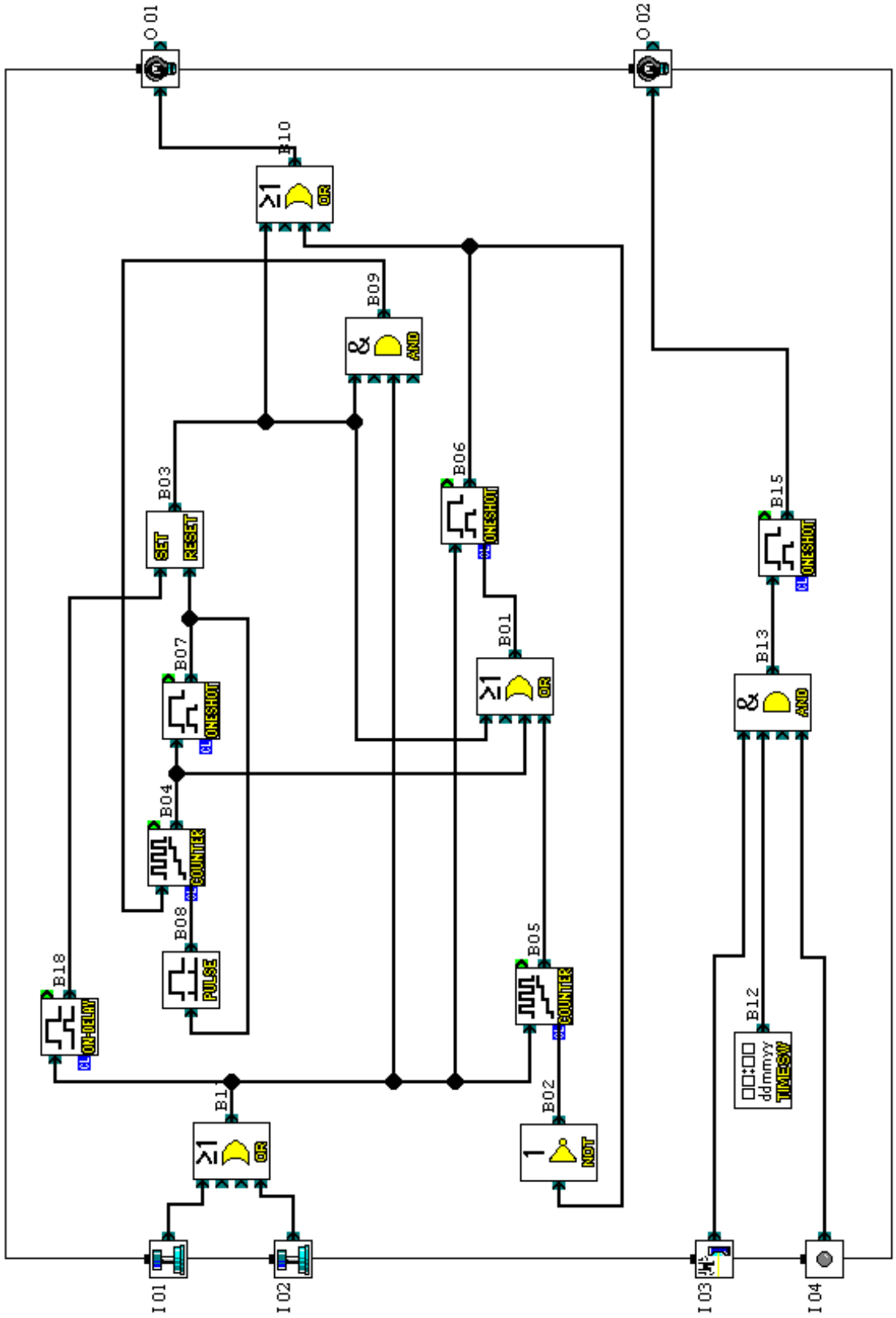
- Use ▲ or ▼ to choose the preset.
- + or – to increase/decrease the values.

The user is offered the option of modifying the timer times for both types of lighting.
Press the " ▸ " key again to enable the next displays.

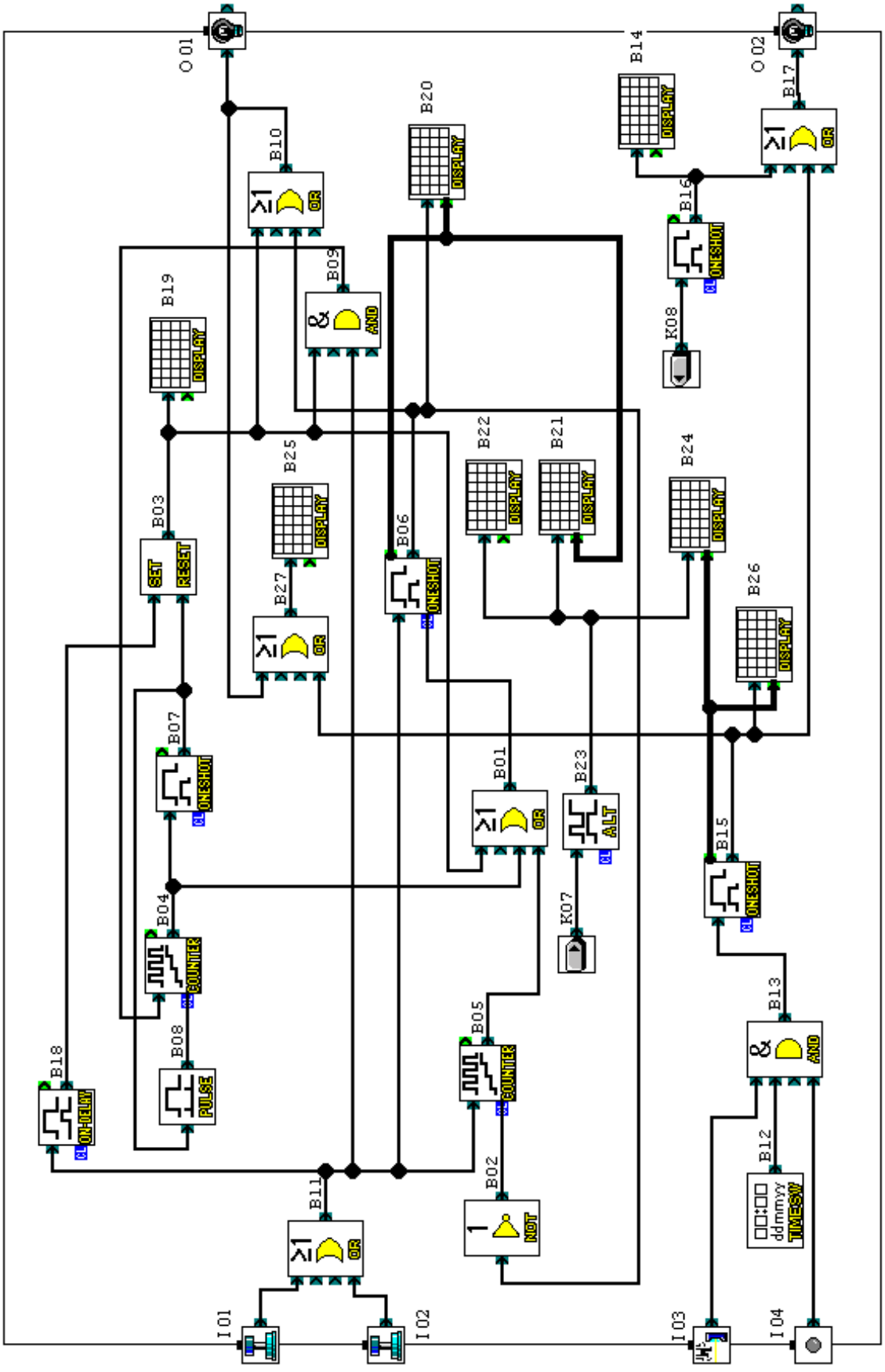
Strong points of the application :

A user-friendly interface on the LCD screen at level 2.

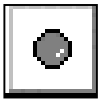
Internal/external lighting for a private house.
Logic diagram (level 1) (ecl-niv1).



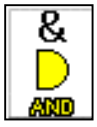
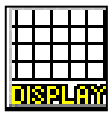
Internal/external lighting for a private house.
Logic diagram (level 2)(ecl-niv2).



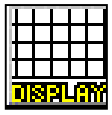
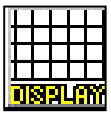
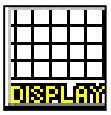
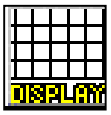
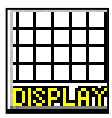
Internal/external lighting for a private house.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	1st push-button in the stairwell	
	I02	2nd push-button in the stairwell	
	I03	Human sensor (movement detector)	
	I04	Light-sensitive switch	
	O01	Internal lighting	
	O02	External lighting	
	B01		
	B02		
	B03	Bistable memory for activating/deactivating the permanent lighting	Prior = Reset
	B04	Counter allowing inhibition of the permanent internal lighting on 2nd operation of one of the push-buttons	Count ### / 2
	B05	Counter activating the internal timed lighting for action on one of the push-buttons	Count ### / 1

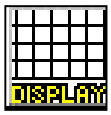
Internal/external lighting for a private house.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B06	2-minute time delay for the internal lighting	OneShotTime : ### / 1200 OutputClearCond : None
	B07	0.5-second time delay delaying the drop-out of the signal inhibiting the permanent lighting	OneShotTime : ### / 5 OutputClearCond : None
	B08	Pulse signal for Reset to Zero	ON to OFF
	B09		
	B10		
	B11		
	B12	Program clock enabling the external lighting each year for the period appearing in the PARAMETERS column	ON 0:0 Each year 1 June DATE OFF 0:0 Each year 1 October DATE
	B13		
	B14	2nd level. Display during the external lighting test	X = 1 Y = 1, Text = ********** External Lamp test **********
	B15	2-minute time delay for the external lighting	OneShotTime : ### / 1200 OutputClearCond : None

Internal/external lighting for a private house.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B16	1-minute time delay relating to the external lighting test	OneShotTime : ### / 600 OutputClearCond : None
	B17		
	B18	2-second time delay from which the permanent lighting is activated	ON Delay ### / 20
	B19	2nd level. Permanent lighting display	X = 7 Y = 3, Text = ON
	B20	2nd level. Current time delay for the internal lighting	Position X = 5 Y = 3 Input = ActOneShot (B06) Special Key = Disable
	B21	2nd level. Display of the preset for the internal lighting time delay	Position X = 5 Y = 3 Input = OneShot (B06) Special Key = Enable
	B22	2nd level. Display for modification of the timer presets	X = 1 Y = 1, Text = **Timer** Setting Int : Ext :
	B23	2nd level. Maintains the display relating to modification of the time delay presets for the internal and external lighting	
	B24	2nd level. Display of the preset for the external lighting time delay	Position X = 5 Y = 4 Input = OneShot (B15) Special Key = Enable
	B25	2nd level. Display upon activation of the internal and external lighting	X = 1 Y = 1, Text = Lighting Int : Ext :

Internal/external lighting for a private house.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B26	2nd level. Display of the current time delay for the external lighting	Position X = 5 Y = 4 Input = ActOneShot (B15) Special Key = Disable
	B27	2nd level	
	K07	2nd level. Key on the front of the Millenium allowing modification of the presets	
	K08	2nd level. Key on the front of the Millenium activating the external lighting test	

Example 2 : Component hoist (L-cycle).
(File : **elev-pie**)

Specification :

A device composed of two cylinders A and B allows the storage and counting of machined components (see figure 2.1).
Pressing and holding down a button allows initialization of the system (cylinder rods fully in and the component counter reset to zero).
CYLINDER A : The platform receives a component whose presence is detected by a sensor which, at each activation, enables lifting of the rod and counting. The actuator associated with this cylinder is a monostable 4.2 control valve; the limit switch contacts of the rod are a0 (in) and a1 (out).
CYLINDER B : Once the rod of cylinder A is fully out, cylinder B ejects the component towards a conveyor at the end of which the components will be stored. The actuator associated with this cylinder is a bistable 4.2 control valve ; the limit switch contacts of the rod are b0 (in) and b1 (out).

Input/output table :

INPUTS		OUTPUTS	
I01	Detection of a component on the rod	**O01**	Monostable control valve: ON (rod A out), OFF (rod A in)
I02	Rod A in sensor	**O02**	Rod B in
I03	Rod A limit switch sensor	**O03**	Rod B out
I04	Rod B in sensor		
I05	Rod B limit switch sensor		
I06	Device initialization		

Model required :

6 input/4 output Millenium :
MAS-10-RCA (100-240 VAC).
MAS-10-RCD (24 VDC).

Program description :

Input I06 initializes the system. The LCD display then shows :

```
Syst.Init.
Pieces         0
```
Component counter

During the cycle, the display is as follows :

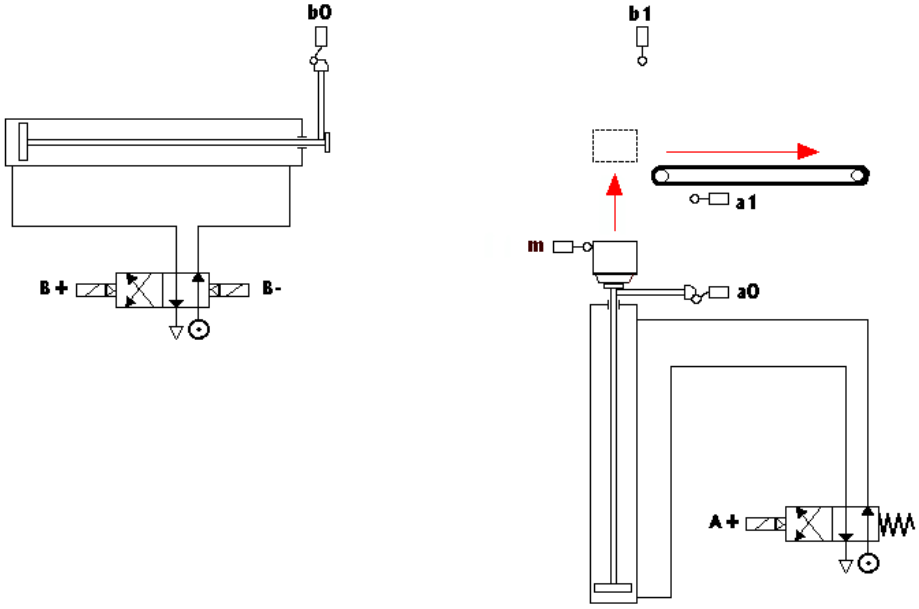
```
Pieces       124
```

Function blocks B01 and B03 are Boolean functions in which logic equations are entered:
Block B01 : B05•/B02
Block B03 : I03•/B02•/I06
This allows the saving of additional logic blocks and, through that, memory space.

Strong points of the application :

The use of Boolean functions simplifies the logic diagram and takes up less memory space. This block is even more efficient when logic blocks are cascaded.

Figure 2.1 : Representation of the component hoist device.

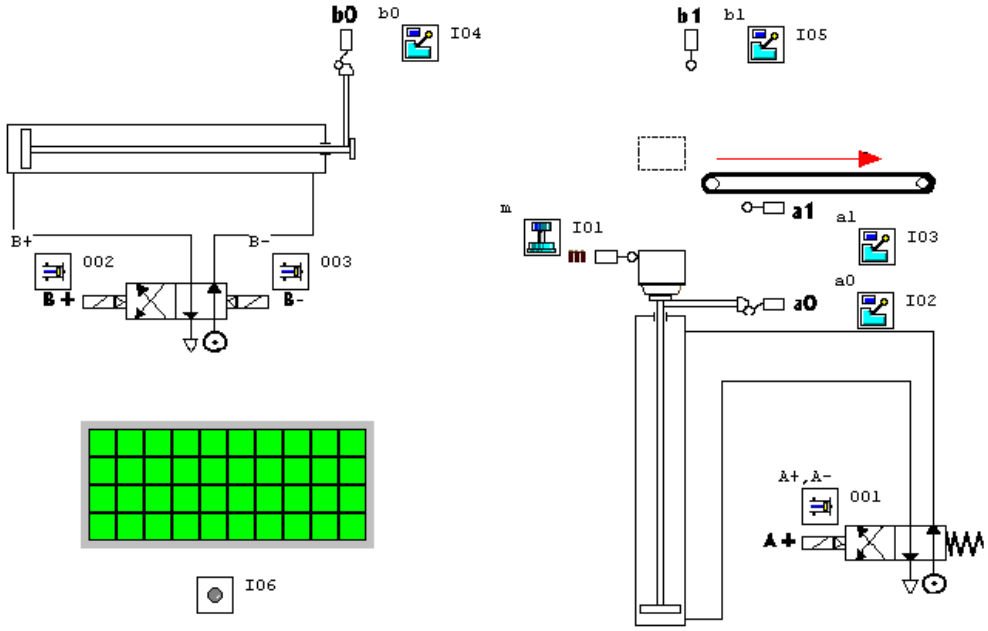


This drawing, once scanned, can serve as a medium for the supervision simulation mode using C.L.S. (Crouzet Logic Software). For this, all that is required is to activate the "**Supervision in Sketch System**" window and, from the "**Insert**" drop-down menu on the toolbar, select the "**insert new object…**" option. An "**Insert object**" dialogue box appears. Then tick "**Create from file**" ; press the "**Find**" button and find the access path for your file. Once the operation has been performed, it only remains to copy the input and output icons from the "**FBD**" window in order to paste them in the representation in the "**Supervision in Sketch System**" window.

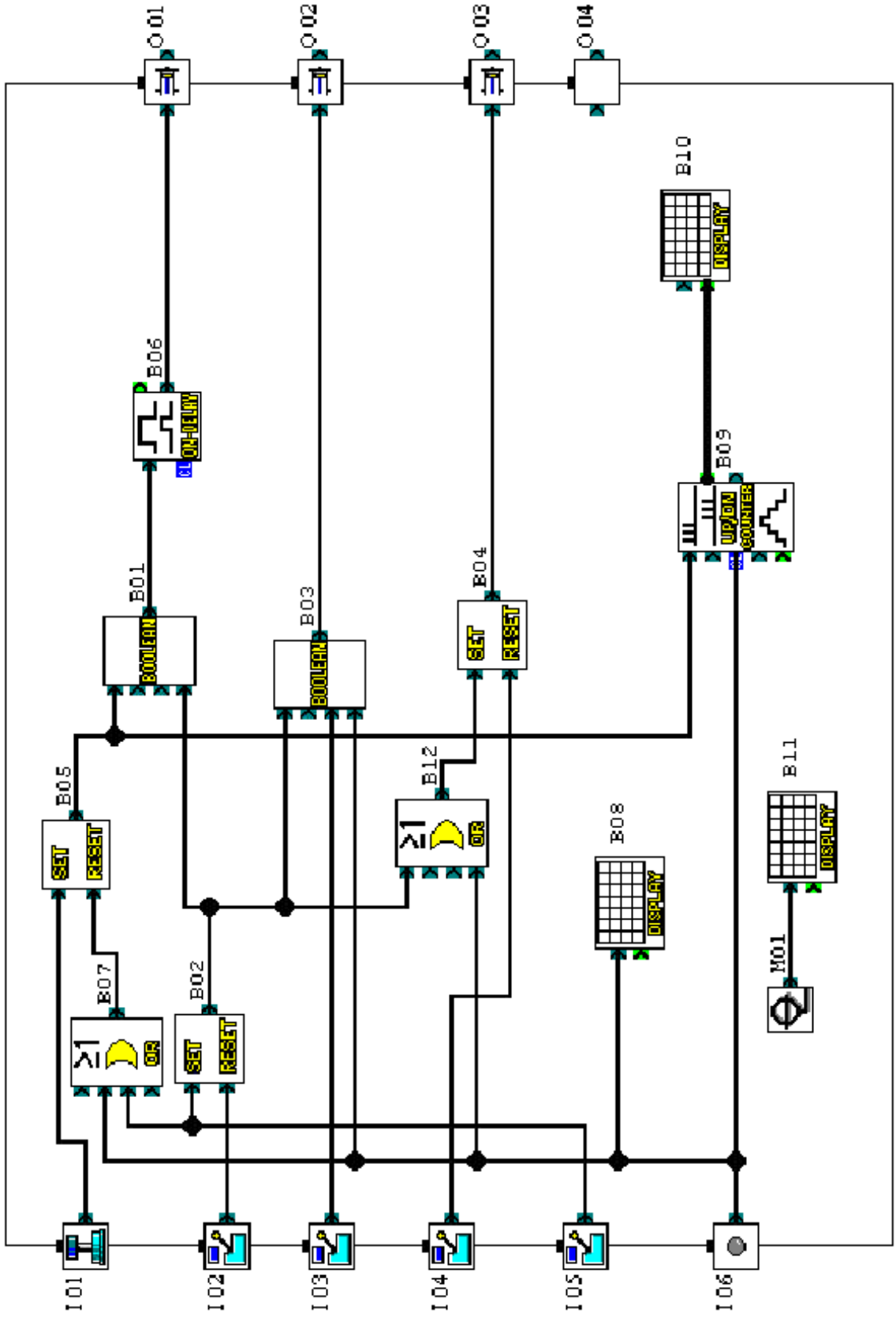
Comments : ➔This procedure is also applicable to Word files, Excel graphics, bitmap images, etc.

➔The "**Link**" option to be ticked in the "**Insert object**" dialogue box makes it possible to pass on the modifications, made to a source file, to the supervision representation.

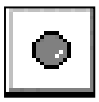
Figure 2.2 : Supervision in Sketch System mode.



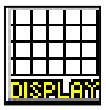
Component hoist (L-cycle).
Logic diagram (elev-pie).



Component hoist (L-cycle).
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	m : Detector of the presence of a component on the hoist platform. Enables the cycle start	
	I02	a0 : ‘Rod in’ sensor (cylinder A)	
	I03	a1 : Rod limit switch sensor (cylinder A)	
	I04	b0 : ‘Rod in’ sensor (cylinder B)	
	I05	b1 : Rod limit switch sensor (cylinder B)	
	I06	System initialization with both cylinder rods in and the counter reset to zero.	
	O01	A+, A- : In and out movement of the rod of cylinder A	
	O02	B+ : Out movement of the rod of cylinder B	
	O03	B- : In movement of the rod of cylinder B	
	O04		

Component hoist (L-cycle).
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B01	Logic equation avoiding the extra addition of a NOT block	B01 = B05 AND NOT B02
	B02	Bistable memory setting conditions for the in movement of the rod of cylinder B	Prior = RESET
	B03	Logic equation	B03 = I03 AND NOT B02 AND NOT I06
	B04	Bistable memory activating the in movement of the rod of cylinder B	Prior = RESET
	B05	Bistable memory for in and out movement of rod A	Prior = RESET
	B06	1-second delay on start-up in order to leave a regular interval between each component	ON Delay : ### / 10
	B07		
	B08	Display upon system initialization	X = 1 Y = 1, Text = Syst.Init.
	B09	Component counter with Reset to Zero capability	Count = 0 Up Counter
	B10	Current component count display	Position X = 5 Y = 3 Input = ActUDCount(B09) Special Key = Enable

Component hoist (L-cycle).
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B11	Permanent display	X = 1 Y = 3, Text = Pieces
	B12		
	M01	Internal bit. Forcing to 1 for a permanent display	

Example 3 : Access control, automation of a gate.
(File : **portail**)

Specification :

A private individual wishes the access to his home to be controlled by an automated gate equipped with a motor with a dual direction of rotation (opening or closing).
Opening : Whether the gate is closed or in an intermediate position, the remote control signal causes complete opening of the gate. During opening, each new operation on the remote control stops or restarts the motor.
As soon as the gate is fully open, a 4-second time delay inhibits its closure.
Closing : During closure, a sensor causes complete opening if someone passing through is detected or if the remote control is activated. As long as this detector is activated (a vehicle stopped in the gateway for example), the gate remains fully open.

Input/output table :

INPUTS		OUTPUTS	
I01	Remote control signal	**O01**	Opening of the gate
I02	Position detector (closed)	**O02**	Closing of the gate
I03	Position detector (open)		
I04	Proximity detector (passage)		

Model required :

4 input/2 output Millenium:
MAS-6-RCA (100-240 VAC).

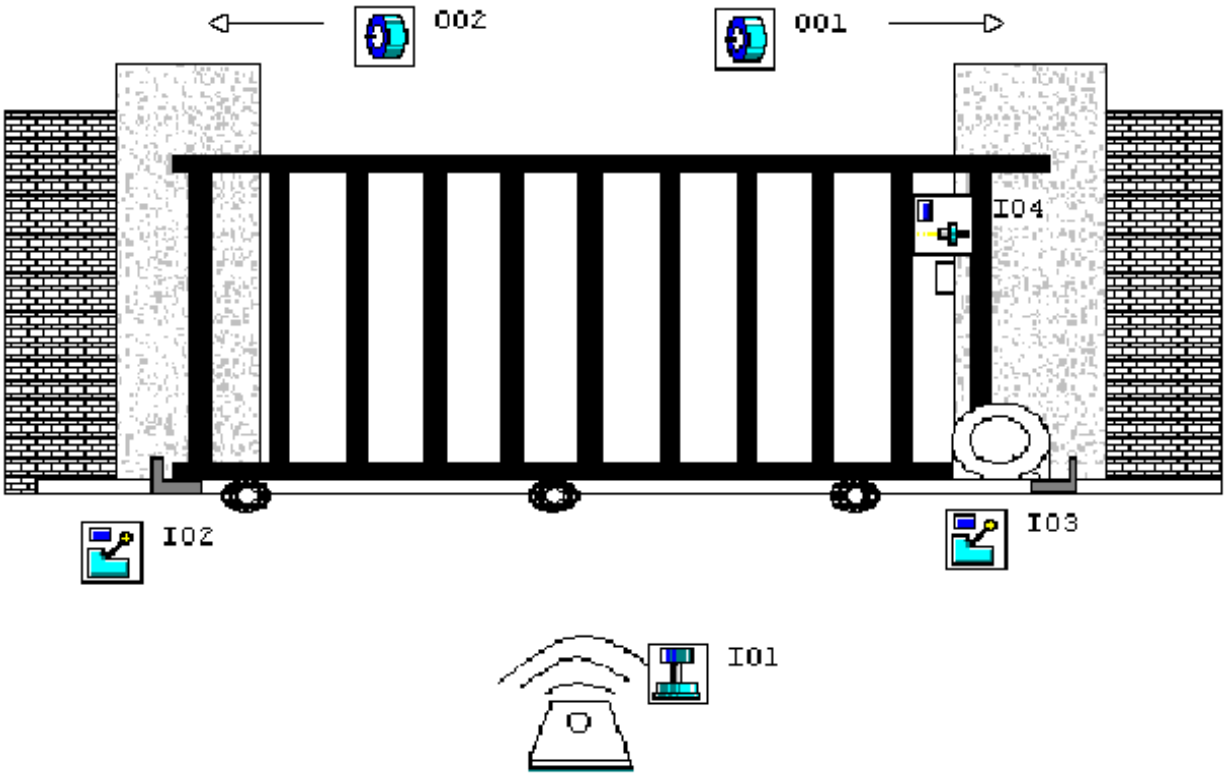
Program description :

Block B06 (ON-DELAY : start-up delay) makes it possible to switch the motor into the opening direction 0.5 seconds after closing is inhibited. This avoids any short-circuit, and mechanical jolts.
Block B07 (ON/OFF-DELAY combined time delay) carries out two functions simultaneously. In effect, the 4-second on-delay timer keeps the gate in the open position before beginning closure. The 0.2-second delay at off-triggering makes it possible to verify the conditions for activating the output of block B01 (AND).
In the interests of saving memory space, it would have been possible for blocks B01, B02 and B04 to be replaced by a Boolean function whose equation would be : I01+/I02•I04•B07

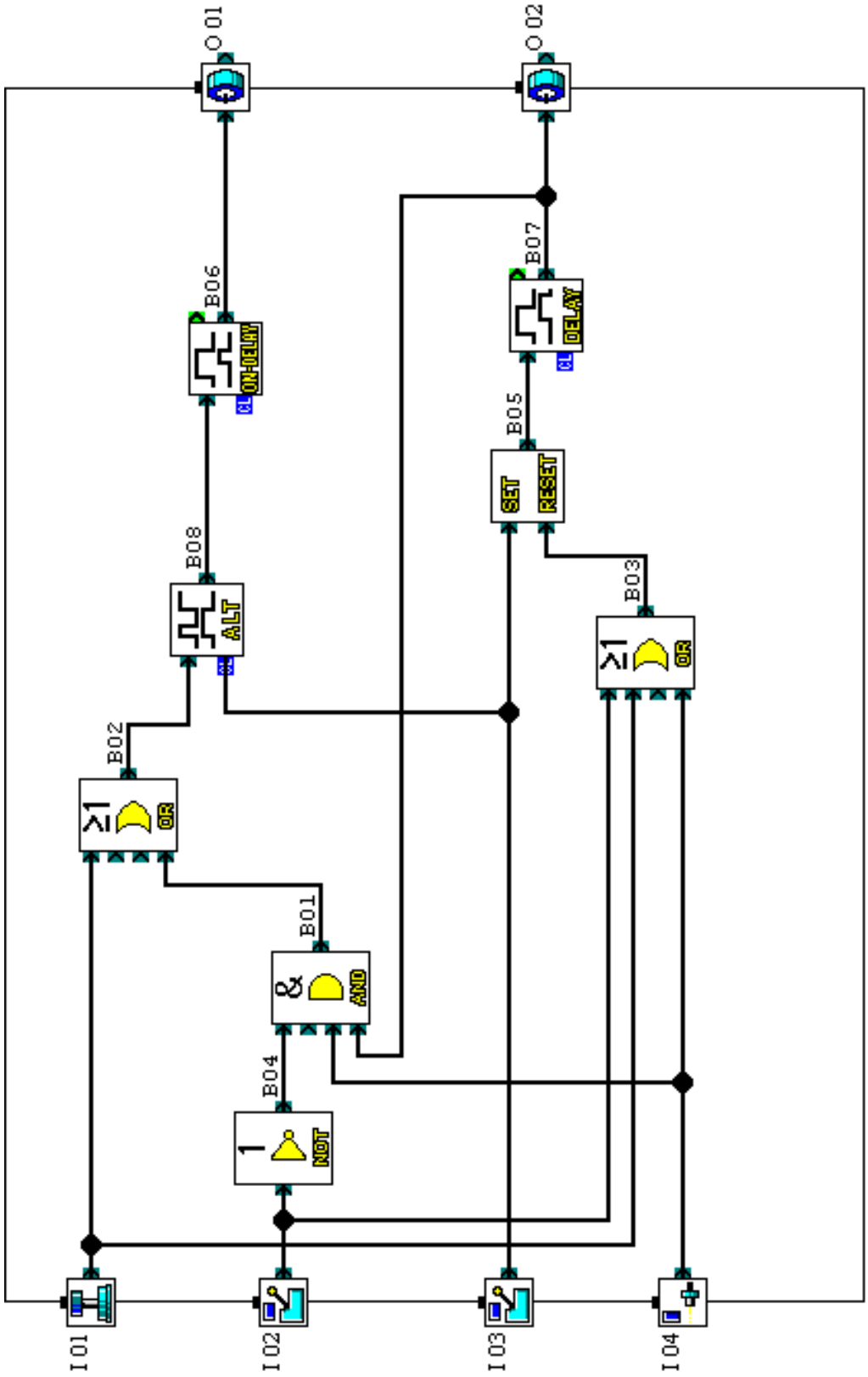
Strong points of the application :

The security of being able to stop the opening or closing of the gate by means of the remote control signal is an essential asset for this type of application.
The parallel connection at the motor terminals allows addition of an indicator lamp warning of any movement of the gate. A Millenium model with 6 inputs/4 outputs offers the capability of activating this lamp a few seconds before opening or closing.
A higher level of programming could incorporate a clock, forcing opening and closing at certain times of the day, and force closing, after a power cut, when the gate is in an intermediate position or fully open.

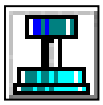
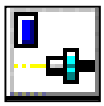
Access control – Automation of a gate.
Example of representation in “Monitoring in Sketch System” mode.



Access control – Automation of a gate.
Logic diagram (portail).



Access control – Automation of a gate.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	Remote control generating a pulse signal	
	I02	Position contactor (gate closed)	
	I03	Position contactor (gate open)	
	I04	Movement detector	
	O01	Opening of the gate (1st direction of rotation of the motor)	
	O02	Closing of the gate (2nd direction of rotation of the motor)	
	B01		
	B02		
	B03		
	B04		

Access control – Automation of a gate.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B05	Bistable memory activating/deactivating closing of the gate	Prior = RESET
	B06	Start-up delay. This 0.5-second time delay avoids any risk of short-circuits of the dual-direction motor, when opening is activated while closing is occurring.	ON Delay : ### / 5
	B07	4-second time delay during which the gate remains fully open. The 0.2-second delay on stopping allows activation of the output of block B01 (AND)	ON Delay : ### / 40 OFF Delay : ### / 2
	B08	Remote control switching function. Activates or deactivates opening of the gate	

Example 4 : School bell.
(File : **So-lycee**)

Specification :

A school wishes to be able to manage the daily bell and the alarm system from a single mechanism.
Activation of the bell is dependent upon a clock (see figure 4.1) as well as its deactivation during public holidays and the school holidays (see figure 4.2).
The "alarm" mode is powered up at night, at weekends (see figure 4.3) and during the days the school is closed. However, it can be inhibited (for an inspection for example) by a contactor. The alarm (given for 1 minute by an alternate 2 seconds ON, 1 second OFF audible signal and an indicator lamp supplied by the same 1-minute time delay) will be activated by the operation of a movement detector. Finally, it is desired that the alarm can be cut off intentionally, for testing for example, by means of a switch.

Input/output table :

INPUTS		OUTPUTS	
I01	Deactivation of the movement detector	**O01**	Bell
I02	Movement detector	**O02**	Indicator lamp
I03	Alarm activation button		
I04	Alarm deactivation		

Model required :

4 input/2 output Millenium:
MAS-6-RCA (100-240 VAC).

Program description :

To program the three clocks, copy or adapt the parameters of Figures 4.1, 4.2 and 4.3.
Boolean block B06 combines the conditions for activating the "alarm" mode according to the equation :

(B10•/I01•I02)+I03

Strong points of the application :

The power of the Millenium time clock makes it possible to manage not only the daily schedules for activating the bell, but also to take into account all the holidays (school holidays and public holidays), solely from two function blocks.
A simple model with 4 inputs and 2 outputs here fulfils many functions. A 6/4 could manage the bell and the alarm on two different audible alarms, and smoke detectors.

Figure 4.1 : Bell activation schedules.

ON	7 : 55	Mon Tue Wed Thu Fri	Weekly
OFF	7 : 56	Mon Tue Wed Thu Fri	Weekly
ON	8 : 00	Mon Tue Wed Thu Fri	Weekly
OFF	8 : 01	Mon Tue Wed Thu Fri	Weekly
ON	8 : 50	Mon Tue Wed Thu Fri	Weekly
OFF	8 : 51	Mon Tue Wed Thu Fri	Weekly
ON	8 : 55	Mon Tue Wed Thu Fri	Weekly
OFF	8 : 56	Mon Tue Wed Thu Fri	Weekly
ON	9 : 45	Mon Tue Wed Thu Fri	Weekly
OFF	9 : 46	Mon Tue Wed Thu Fri	Weekly
ON	9 : 55	Mon Tue Wed Thu Fri	Weekly
OFF	9 : 56	Mon Tue Wed Thu Fri	Weekly
ON	10 : 00	Mon Tue Wed Thu Fri	Weekly
OFF	10 : 01	Mon Tue Wed Thu Fri	Weekly
ON	10 : 50	Mon Tue Wed Thu Fri	Weekly
OFF	10 : 51	Mon Tue Wed Thu Fri	Weekly
ON	10 : 55	Mon Tue Wed Thu Fri	Weekly
OFF	10 : 56	Mon Tue Wed Thu Fri	Weekly
ON	11 : 45	Mon Tue Wed Thu Fri	Weekly
OFF	11 : 46	Mon Tue Wed Thu Fri	Weekly
ON	13 : 55	Mon Tue Wed Thu Fri	Weekly
OFF	13 : 56	Mon Tue Wed Thu Fri	Weekly
ON	14 : 00	Mon Tue Wed Thu Fri	Weekly
OFF	14 : 01	Mon Tue Wed Thu Fri	Weekly
ON	14 : 50	Mon Tue Wed Thu Fri	Weekly
OFF	14 : 51	Mon Tue Wed Thu Fri	Weekly
ON	14 : 55	Mon Tue Wed Thu Fri	Weekly
OFF	14 : 56	Mon Tue Wed Thu Fri	Weekly
ON	15 : 45	Mon Tue Wed Thu Fri	Weekly
OFF	15 : 46	Mon Tue Wed Thu Fri	Weekly
ON	15 : 55	Mon Tue Wed Thu Fri	Weekly
OFF	15 : 56	Mon Tue Wed Thu Fri	Weekly
ON	16 : 00	Mon Tue Wed Thu Fri	Weekly
OFF	16 : 01	Mon Tue Wed Thu Fri	Weekly
ON	16 : 50	Mon Tue Wed Thu Fri	Weekly
OFF	16 : 51	Mon Tue Wed Thu Fri	Weekly
ON	16 : 55	Mon Tue Wed Thu Fri	Weekly
OFF	16 : 56	Mon Tue Wed Thu Fri	Weekly
ON	17 : 45	Mon Tue Wed Thu Fri	Weekly
OFF	17 : 46	Mon Tue Wed Thu Fri	Weekly

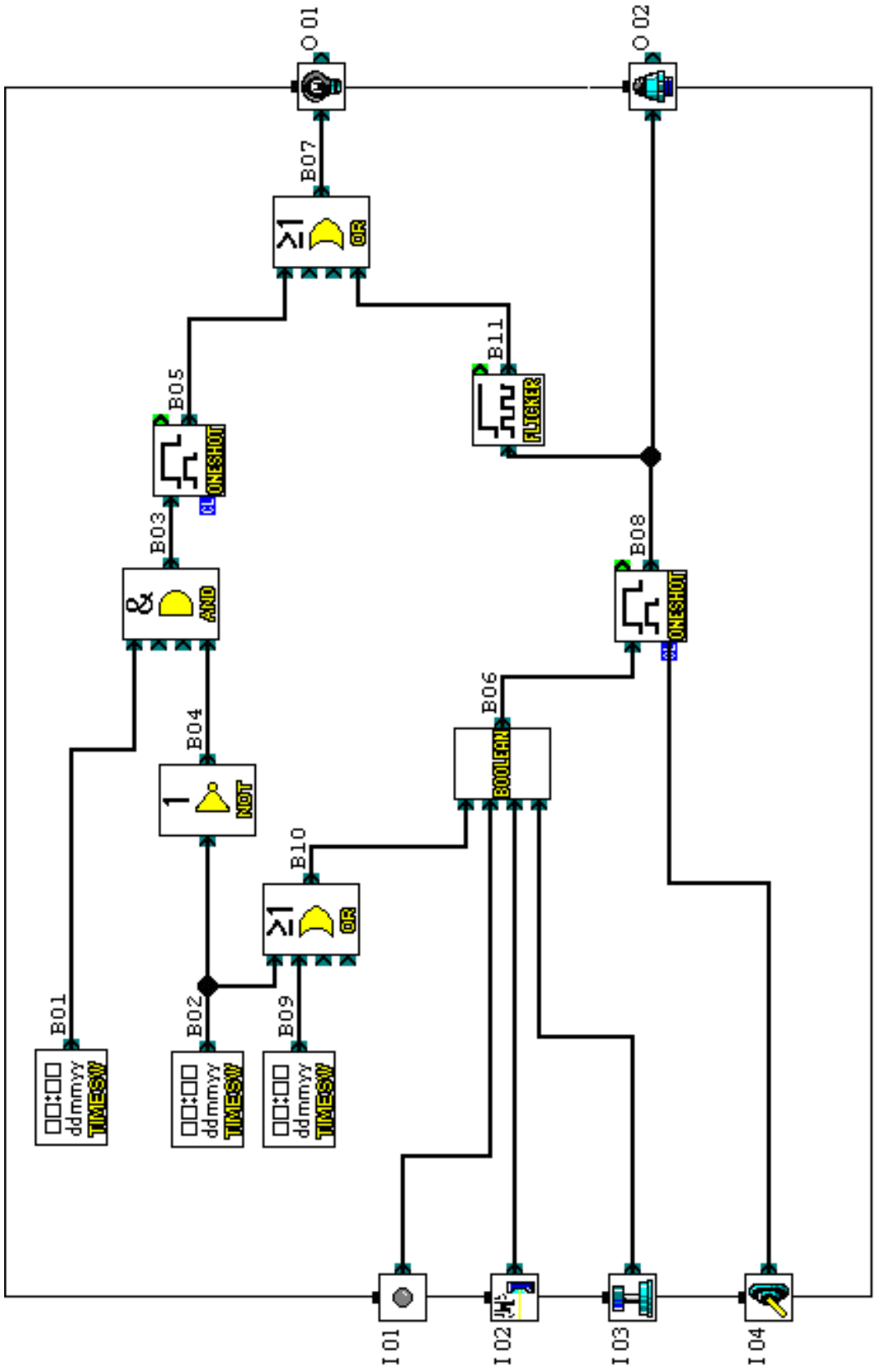
Figure 4.2 : Days for deactivating the bell (public holidays, school holidays), and for activating the intruder alarm.

ON	20 :00	18.12.1998	Date
OFF	5 :00	4.1.1999	Date
ON	20 :00	12.2.1999	Date
OFF	5 :00	1.3.1999	Date
ON	20 :00	9.4.1999	Date
OFF	5 :00	26.4.1999	Date
ON	20 :00	30.6.1999	Date
OFF	5 :00	6.9.1999	Date
ON	20 :00	29.10.1999	Date
OFF	5 :00	8.11.1999	Date
ON	0 :00	1 January each year	Date
OFF	0 :00	2 January each year	Date
ON	0 :00	5.4.1999	Date
OFF	0 :00	6.4.1999	Date
ON	0 :00	1 May each year	Date
OFF	0 :00	2 May each year	Date
ON	0 :00	8 May each year	Date
OFF	0 :00	9 May each year	Date
ON	0 :00	13.5.1999	Date
OFF	0 :00	14.5.1999	Date
ON	0 :00	24.5.1999	Date
OFF	0 :00	25.5.1999	Date
ON	0 :00	14 July each year	Date
OFF	0 :00	15 July each year	Date
ON	0 :00	15 August each year	Date
OFF	0 :00	16 August each year	Date
ON	0 :00	11 November each year	Date
OFF	0 :00	12 November each year	Date
ON	0 :00	25 December each year	Date
OFF	0 :00	26 December each year	Date

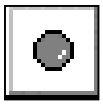
Figure 4.3 : Intruder alarm activation schedules.

ON	20 :00	DAILY	Weekly
OFF	7 :00	DAILY	Weekly
ON	0 :00	Saturday	Weekly
OFF	23 :00	Sunday	Weekly

School bell.
Logic diagram (so-lycee).



School bell.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	If this input is activated, this causes deactivation of the movement detector	
	I02	Movement detector active if an intruder enters the room	
	I03	Fire alarm	
	I04	Forced stopping of the alarm	
	O01	Bell	
	O02	Indicator lamp activated only in “alarm” mode	
	B01	Activation of the bell	See figure 4.1
	B02	Inhibition of the bell	See figure 4.2
	B03		
	B04		

School bell.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B05	Time delay defining the bell duration	OneShotTime : ### / 30 OutputClearCond : None
	B06	Logic equation	B06 = (B10 AND (NOT I01) AND I02) OR I03
	B07		
	B08	Time delay on power-up defining the duration of activation of the “alarm” mode	OneShotTime : ### / 600 OutputClearCond : None
	B09	Intruder alarm activation schedules	See figure 4.3
	B10		
	B11	Pulse generator with dual time delay for activating the bell in “alarm” mode	ONTime : ### / 20 OFFTime : ### / 10

Example 5 : Temperature regulation of two zones.
(File : **Regul**)

Specification :

Two zones (rooms or a conference hall) have their ambient temperature controlled by their own heating system composed of a fan and a heating resistor. Temperature probes, judiciously placed in each zone, make it possible, via a converter, to have 0-10 V analogue signals available.
Screen displays : For each zone, information on the ambient temperature and activation of the heating resistor is given on the Millenium screen, as are the upper and lower limits (common to both zones and modifiable by the user directly from keys on the Millenium ; see figure 5.2 to ascertain the procedure) used for regulation (see figure 5.1).
Activation of the fan is dependent on different conditions according to whether the mode is "Heat" or "Cool".
A switch offers the option of deactivating the system for heating both zones simultaneously.
In order to save energy, the heating resistor can be activated only if the fan is running **and** the "Heat" mode is selected.

Input/output table :

INPUTS		OUTPUTS	
I01	Analogue input (0 – 10 V. Zone 1)	**O01**	Zone 1 fan
I02	Heat / Cool switch (zone 1)	**O02**	Zone 1 heating resistor
I03	Analogue input (0 – 10 V. Zone 2)	**O03**	Zone 2 fan
I04	Heat / Cool switch (zone 2)	**O04**	Zone 2 heating resistor
I05	On/Off switch		

Model required :

6 input/4 output Millenium:
MAS-10-RCA (100-240 VAC).
MAS-10-RCD (24 VDC).

Program description :

On first power-up, the Millenium LCD screen displays the following data :

```
Zone1  0.0
Zone2  0.0
UpLim    0
LowLim   0
```

It is necessary only to exert a simple pressure on the Millenium "▸" key to call up the values of presets defined in the **UP/DN COUNTER** function blocks (B05 and B06) : these values correspond to the limits between which the temperature is maintained (for example, the temperature of zone 1 must be kept between 10 and 20 °C).
Following this operation, the display is as follows:

```
Zone1  0.0
Zone2  0.0
UpLim  200
LowLim 100
```

Preset values in tenths of a degree Celsius.
Here : 20.0°C
10.0°C

If input I05 (On/Off switch) is not activated (low state), regulation takes place normally. The display might be :

```
Zone1 21.0
Zone2*18.0
UpLim  200
LowLim 100
```

Temperature of zones 1 and 2 in °C.
The letter "H" specifies "Heat" mode, its absence "Cool" mode.

If I05 is activated, the screen then shows :

```
**********
**SYSTEM**
***OFF****
**********
```

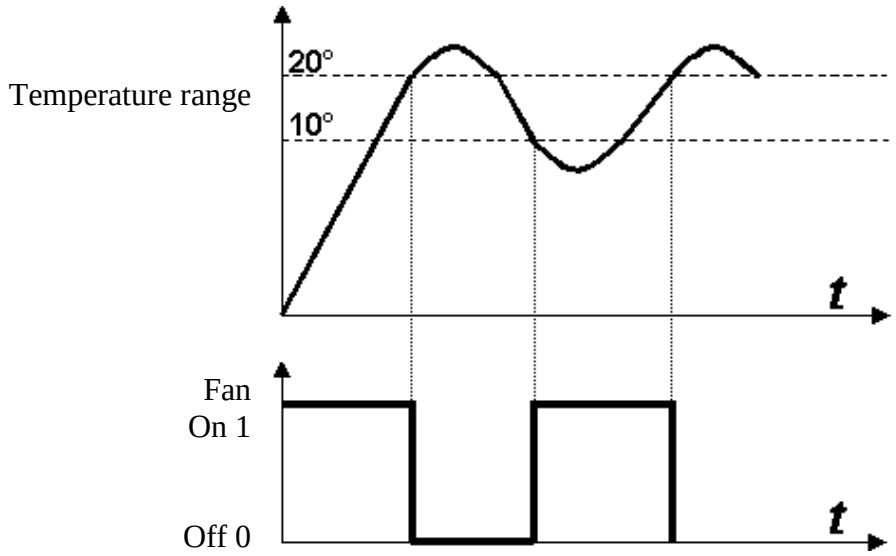
Strong points of the application :

Use of 0-10 V analogue inputs.
The man/machine interface is improved by the assignment keys on the front to simple specific functions (modifications of the preset values).

Figure 5.1 : Temperature regulation of a zone (with the parameters considered in the program).

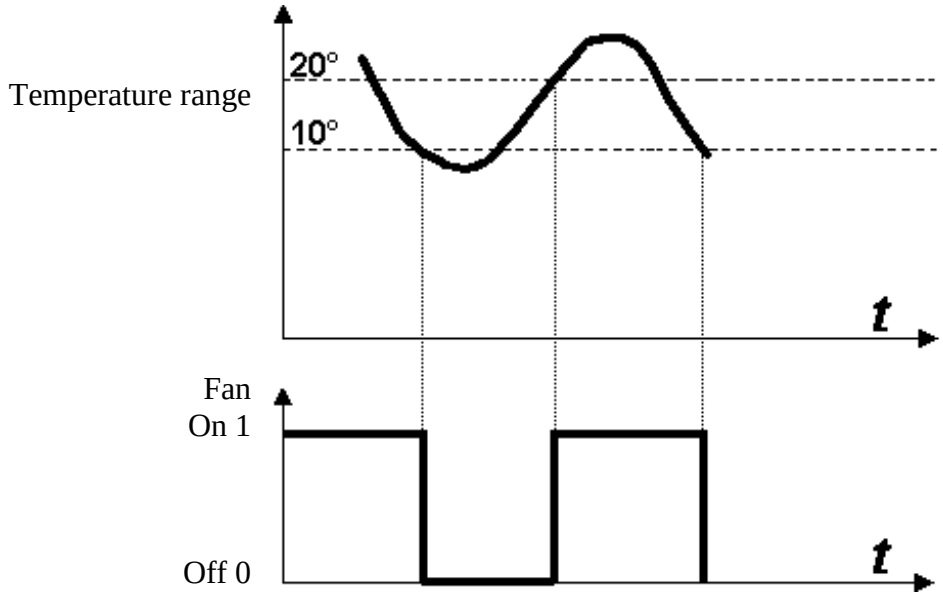
Heat mode.

External temperature = 7°C for example.



Cool mode.

External temperature = 35°C for example.



This operation makes it possible to maintain the temperature of a zone within a well-defined range (Hysteresis).

Figure 5.2 : Procedure for modifying presets directly from the Millenium keys.

The values defined in blocks B05 and B06 are initially those appearing below.

U	p	L	i	m			2	0	0
L	o	w	L	i	m		1	0	0

Modification of these values is possible since the "**Special key**" option of **DISPLAY** blocks B07 and B08 is ticked (which is not the case for the display of the current values given by **DISPLAY** blocks B01 and B16 for which access is barred).

Note that only the data connected with the "numerical values" (green) pin can be modified if necessary.

1-Press any key on the front, except the " ▶ " key which has already been assigned to a function, which has the effect of making one of the values flash.

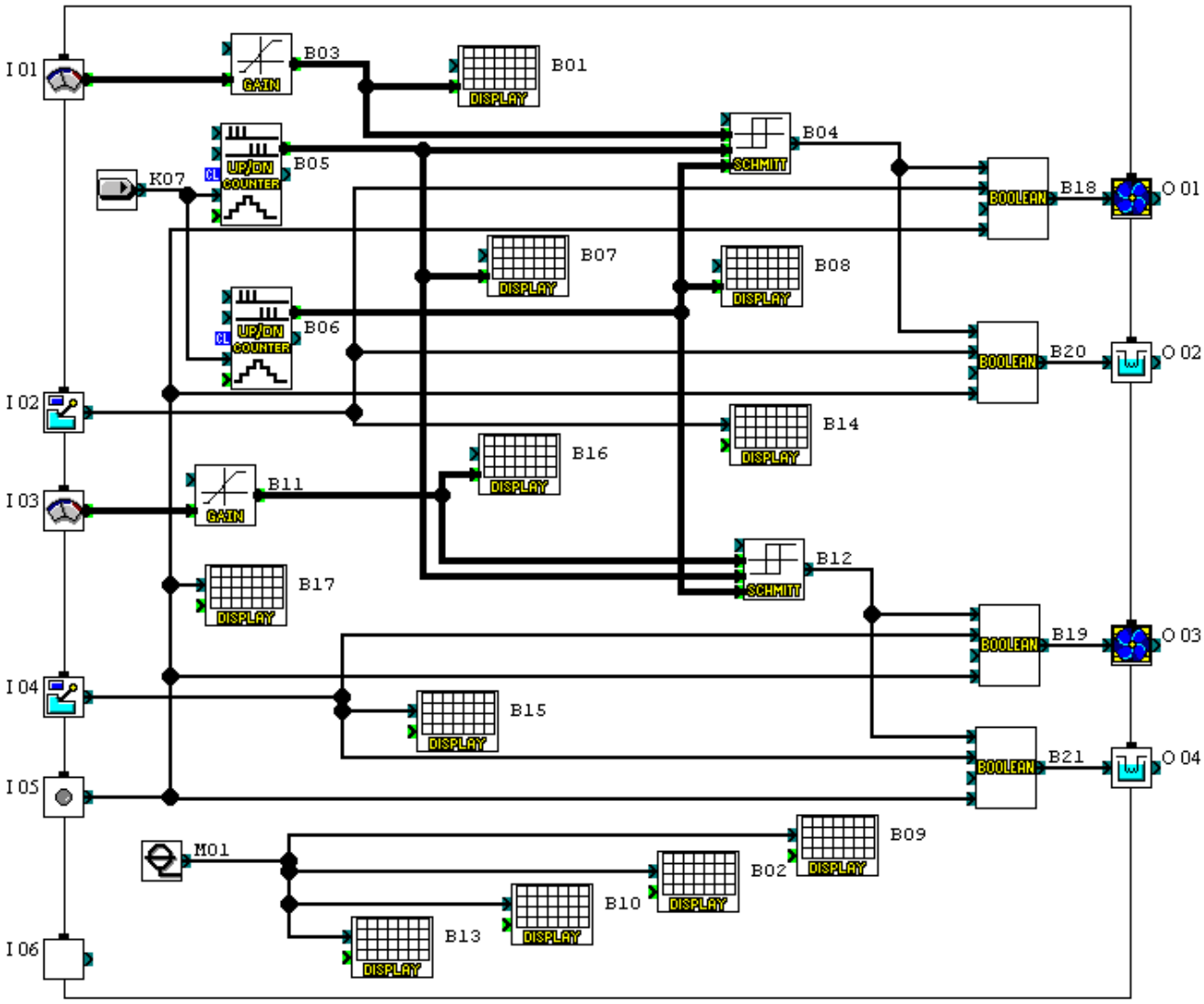
2-Select the value to be modified using the " ▲ " or " ▼ " keys.

3-Use the "+" or "-" keys to increment or decrement the values.

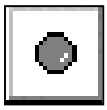
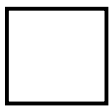
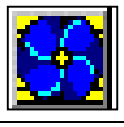
4-Press "**OK**" to confirm the entry (the flashing disappears).

NB : Between steps 1 and 3, the "**ESC**" key makes it possible to cancel the modification and recover the last values entered.

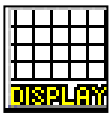
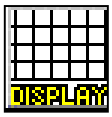
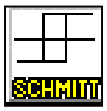
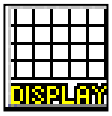
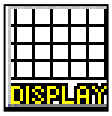
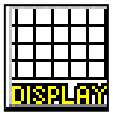
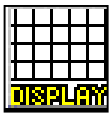
Temperature regulation of two zones.
Logic diagram (regul).



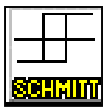
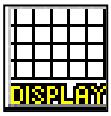
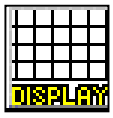
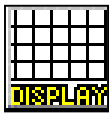
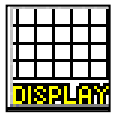
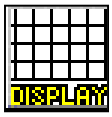
Temperature regulation of two zones.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	0-10V analogue input (zone 1 temperature probe)	
	I02	Zone 1 Heat/Cool switch	
	I03	0-10V analogue input (zone 2 temperature probe)	
	I04	Zone 2 Heat/Cool switch	
	I05		
	I06		
	O01	Zone 1 fan	
	O02	Zone 1 heating resistor	
	O03	Zone 2 fan	
	O04	Zone 2 heating resistor	

Temperature regulation of two zones.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B01	Display of the current temperature (zone 1). The ratio of 1/10 makes it possible to display the value to one digit after the decimal point.	Position X = 4 Y = 1 Input=GainAnalogVal(B03) Ratio = 1/10
	B02	Text display	X = 1 Y = 1, Text = Zone1
	B03	Block from which the conversion, into a temperature, of the numerical value coming from the analogue input is performed. The 400/250 ratio means that the maximum temperature of 40°C corresponds to the numerical value 250.	Y = (400/250)X The gain numerator is multiplied by 10 (400 instead of 40) in order to have a display of the temperature to three digits, one of which is after the decimal point. Offset© = 0 UpBound = 400 LowBound = 0
	B04	Block defining the activation, or deactivation, limits of the heating system	DataGainAnalogVal ON to OFF : ActUDCount OFF to ON : ActUDCount
	B05	Upper boundary defining the limit for changing state from On to Off	Count = 200
	B06	Lower boundary defining the limit for changing state from Off to On	Count = 100
	B07	Display on the screen of the upper limit causing the state of the heating system to change from On to Off	Position X = 5 Y = 3 Input = ActUDCount(B05) Special Key = Enable
	B08	Display on the screen of the lower limit causing the state of the heating system to change from Off to On	Position X = 5 Y = 4 Input = ActUDCount(B06) Special Key = Enable
	B09	Text display	X = 1 Y = 3, Text = UpLim
	B10	Text display	X = 1 Y = 4, Text = LowLim

Temperature regulation of two zones.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B11	Block from which the conversion, into a temperature, of the numerical value coming from the analogue input is performed	Y = (400/250)X
	B12	Block defining the activation or deactivation limits of the heating system	DataGainAnalogVal ON to OFF : ActUDCount OFF to ON : ActUDCount
	B13	Text display	X = 1 Y = 2, Text = Zone2
	B14	Text display (zone 1 resistor activation)	X = 6 Y = 1, Text = *
	B15	Text display (zone 2 resistor activation)	X = 6 Y = 2, Text = *
	B16	Display of the current temperature (zone 2)	Position X = 4 Y = 2 Input=GainAnalogVal(B11) Ratio = 1/10
	B17	Text display for complete deactivation of the system	X = 1 Y = 1, Text = ********** **SYSTEM** ***OFF**** **********
	B18	Logic equation allowing the zone 1 fan to be inhibited if input I05 is active	B18=NOT I05 AND (B04 AND I02 OR NOT (B04 OR I02))
	B19	Logic equation allowing the zone 2 fan to be inhibited if input I05 is active	B19=NOT I05 AND (B12 AND I04 OR NOT (B12 OR I04))
	B20	Logic equation allowing the zone 1 heating resistor to be inhibited if input I05 is active	B20=B04 AND I02 AND NOT I05

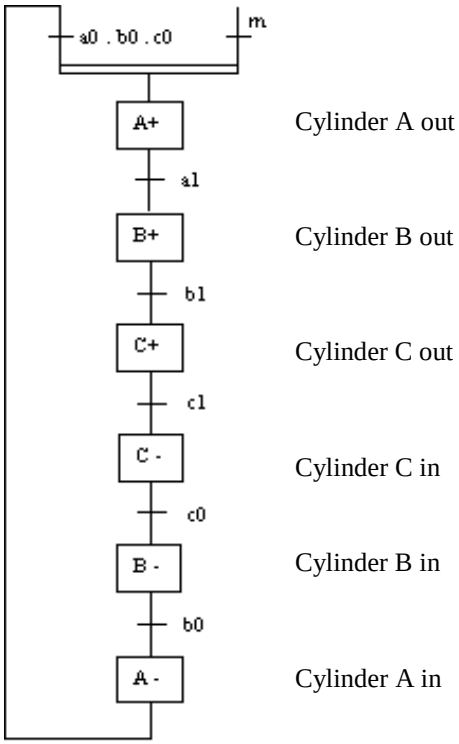
Temperature regulation of two zones.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B21	Logic equation allowing the zone 2 heating resistor to be inhibited if input I05 is active	B21=B12 AND I04 AND NOT I05
	M01	Internal bit: forcing to 1. Allows a permanent display on the LCD screen	
	K07	Millenium key making it possible to return to the preprogrammed preset values (limits)	

Example 6 : Movement of three cylinders (U-cycle).
(File : **CycleU**)

Specification :

An industrial machine has three cylinders A, B and C which must operate as shown in the following GRAFCET:



The condition "m" corresponds to activation of the Start/Stop button. The in and out movements of the rods of cylinders A, B, C are respectively registered by position detectors (a0, a1), (b0, b1), (c0, c1).
The "-" key of the Millenium must make it possible to move in the rods of the three cylinders to initialize the system.
The Millenium outputs should be connected to the actuators of cylinders A, B and C (bistable 4/2 control valves).

Input/output table :

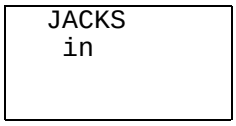
INPUTS		OUTPUTS	
I01	Start/Stop button	**O01**	Actuator for rod A out : A+
I02	Position detector a0	**O02**	Actuator for rod B out : B+
I03	Position detector a1	**O03**	Actuator for rod C out : C+
I04	Position detector b0	**O04**	Actuator for rod C in : C-
I05	Position detector b1	**O05**	Actuator for rod B in : B-
I06	Position detector c0	**O06**	Actuator for rod A in : A-
I07	Position detector c1		

Model required :

12 input/8 output Millenium :
MAS-20-RCA (100-240 VAC).
MAS-20-RCD (24 VDC).

Program description :

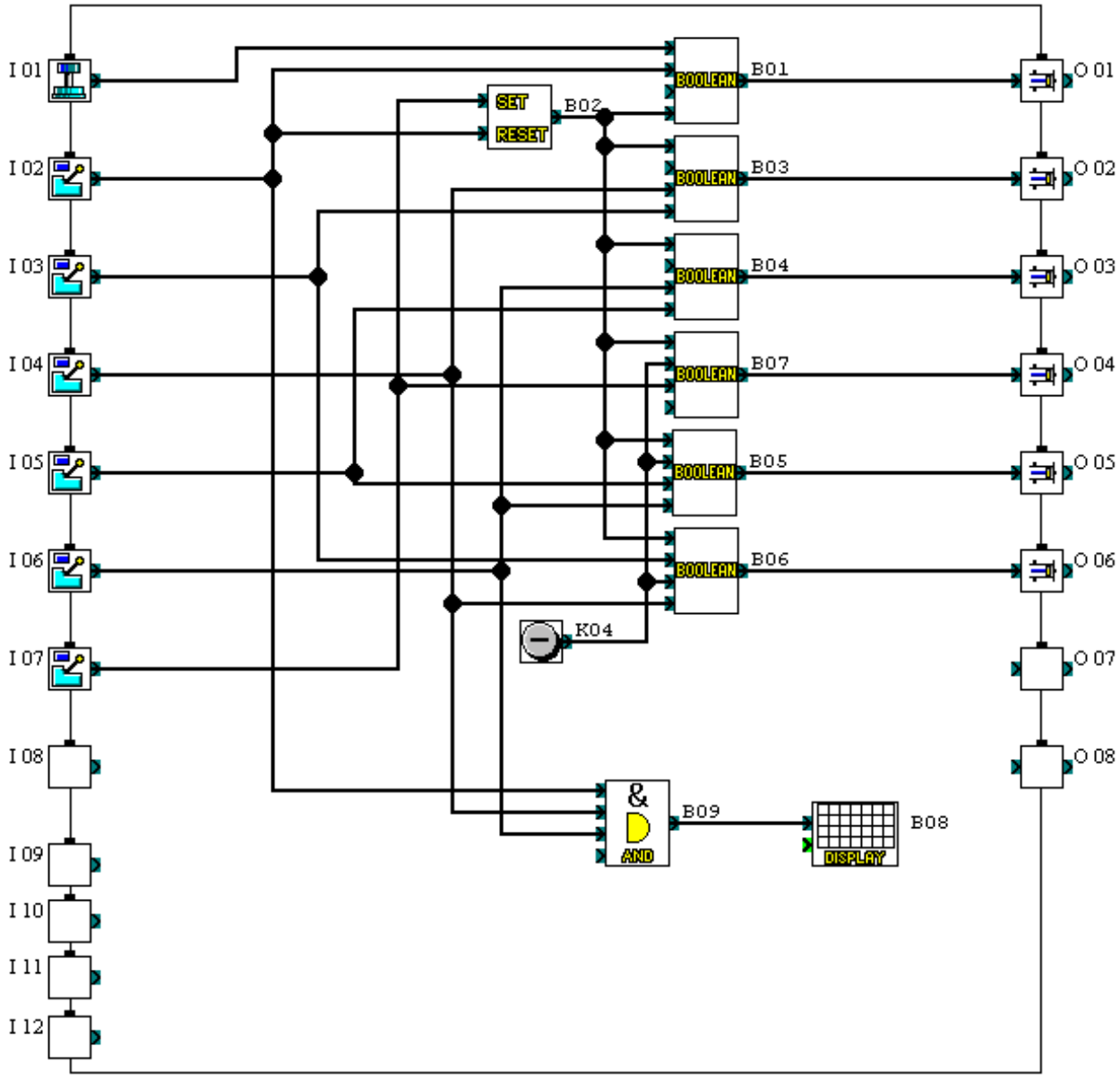
For correct operation, the system must be initialized **when stopped** (I01 at logic state 0) using the "-" key on the front of the Millenium. In this case, the conditions enabling the start of the cycle are correctly restored (if input I01 is active ⇔ Start button "m").
As long as the "-" key is kept pressed, the LCD screen displays the following comment :



Strong points of the application :

The command, through a Millenium key, for moving the three rods in, avoids using an additional input which can, if necessary, be used to control other systems, since this is a 12/8 model.

Movement of three cylinders (U-cycle).
Logic diagram (cycleu).



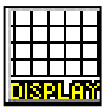
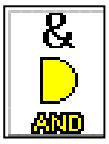
Movement of three cylinders (U-cycle).
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	System Start/Stop button	
	I02	‘Rod in’ position detector for cylinder A : a0.	
	I03	‘Rod out’ position detector for cylinder A : a1	
	I04	‘Rod in’ position detector for cylinder B : b0.	
	I05	‘Rod out’ position detector for cylinder B : b1	
	I06	‘Rod in’ position detector for cylinder C : c0	
	I07	‘Rod out’ position detector for cylinder C : c1	
	I08		
	I09		
	I10		
	I11		
	I12		

Movement of three cylinders (U-cycle).
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	O01	Actuator A+ : movement out of cylinder A rod	
	O02	Actuator B+ : movement out of cylinder B rod	
	O03	Actuator C+ : movement out of cylinder C rod	
	O04	Actuator C- : movement in of cylinder C rod	
	O05	Actuator B- : movement in of cylinder B rod	
	O06	Actuator A- : movement in of cylinder A rod	
	O07		
	O08		
	B01	Logic equation combining the conditions for activating actuator A+	B01=I01 AND NOT B02 AND I02
	B02	Bistable memory	Prior RESET

Movement of three cylinders (U-cycle).
Information on the function blocks.

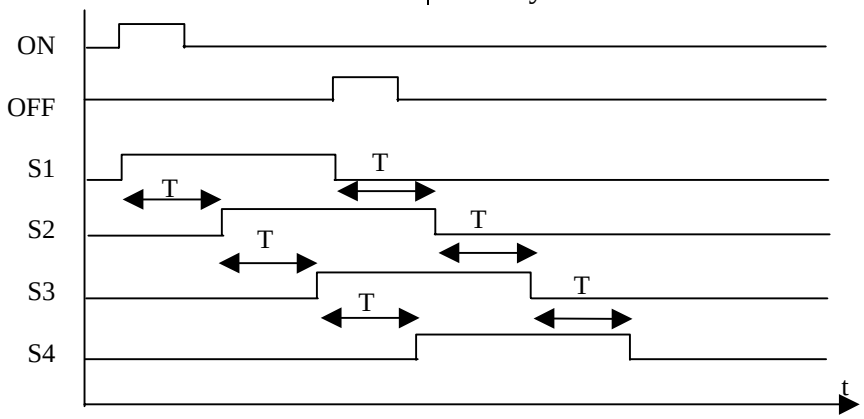
ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B03	Logic equation combining the conditions for activating actuator B+	B03=I03 AND NOT B02 AND I04
	B04	Logic equation combining the conditions for activating actuator C+	B04=I05 AND NOT B02 AND I06
	B05	Logic equation combining the conditions for activating actuator B-	B05=I06 AND B02 AND I05 OR K04
	B06	Logic equation combining the conditions for activating actuator A-	B06=I04 AND B02 AND I03 OR K04
	B07	Logic equation combining the conditions for activating actuator C-	B07=B02 AND I07 OR K04
	B08	Text display	X = 1 Y = 1, Test = JACKS in
	B09		
	K04	Millenium key assigned to moving the three rods in	

Example 7 : Cam timer : power build-up for heating elements of a boiler.
(File : **mpuis-v1** and **mpuis-v2**)

Specification :

In order to avoid any over-consumption when a boiler starts up, the power for the heating elements is built up gradually, and then, at shut-down, the power is gradually reduced.

The operating principle can be defined as shown by the following timing diagram :



An "On" button (ON) enables activation of the first heating element (S1). After a time T (the time delay), the second element (S2) comes on. After the same time T, it is the turn of the third element (S3), and then the fourth element (S4), again at the end of T.
An "Off" button (OFF) deactivates S1. The other three elements are then deactivated progressively at the end of T on each deactivation of the previous element.

Input/output table :

INPUTS		OUTPUTS	
I01	On Button	**O01**	First heating element S1
I02	Off Button	**O02**	Second heating element S2
I03	Initialization (Version 2)	**O03**	Third heating element S3
		O04	Fourth heating element S4

Model required :

6 input/4 output Millenium :
MAS-10-RCA (100-240 VAC).
MAS-10-RCD (24 VDC).

Program description :

Two versions meeting the specification are presented here.
Version 1 : In principle, the time delay T is identical for activation/deactivation of all the heating elements. However, the program includes three **DELAY** function blocks. The function to be implemented according to the specification necessitates that the same time delay value is entered into these three blocks. Consequently, if the user wishes to modify one of them, he must take care to enter the new preset into the three blocks.
Version 2 : This time the user can easily, even when the program is running, modify the single value of the time delay defined in the **ONE SHOT** function block. This value is displayed on the screen.
The modification procedure is as follows :

➔Press any key on the front.

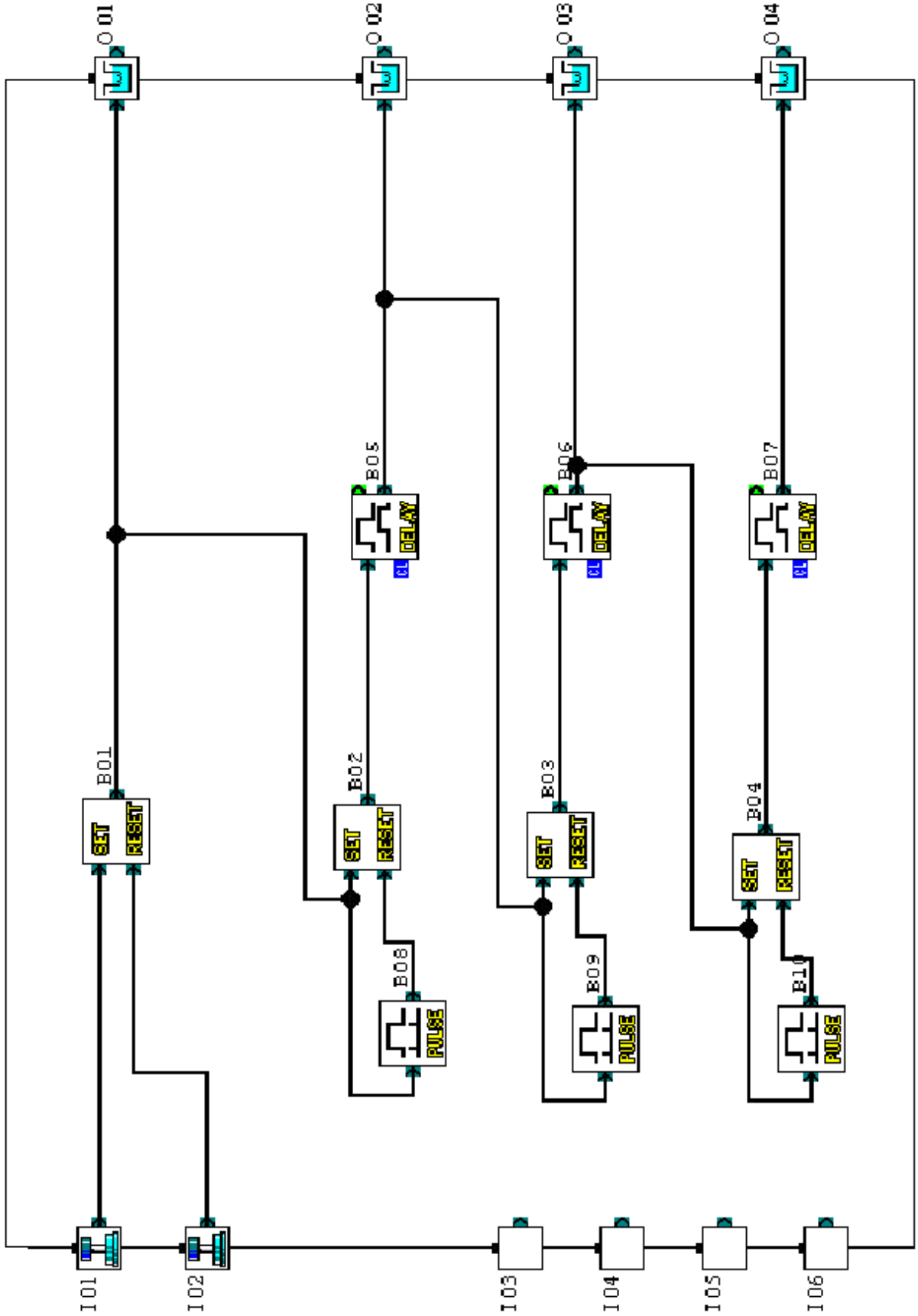
➔Use the "+" or "-" keys to change the value.

➔Confirm your entry by pressing "OK", or cancel with "ESC" (the effect of this is to recall the last value entered).

Strong points of the application :

Version 2 of the program reproduces a four-output cam timer with all the features of use offered by the Millenium.

Cam timer : power build-up for heating elements of a boiler.
Logic diagram (version 1) (mpuis-v1).



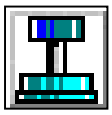
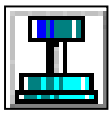
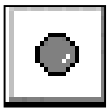
Cam timer : power build-up for heating elements of a boiler.
Information on the function blocks (version 1).

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	On button	
	I02	Off button	
	I03		
	I04		
	I05		
	I06		
	O01	S1 : 1st heating element	
	O02	S2 : 2nd heating element	
	O03	S3 : 3rd heating element	
	O04	S4 : 4th heating element	
	B01	Bistable memory activating the 1st heating element	Prior = RESET

Cam timer : power build-up for heating elements of a boiler.
Information on the function blocks (version 1).

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B02	Bistable memory activating the 2nd heating element	Prior = RESET
	B03	Bistable memory activating the 3rd heating element	Prior = RESET
	B04	Bistable memory activating the 4th heating element	Prior = RESET
	B05	Time delay with on delay and off delay for activating the 2nd heating element	ON Delay : ### / 20 OFF Delay : ### / 20
	B06	Time delay with on delay and off delay for activating the 3rd heating element	ON Delay : ### / 20 OFF Delay : ### / 20
	B07	Time delay with on delay and off delay for activating the 4th heating element	ON Delay : ### / 20 OFF Delay : ### / 20
	B08		ON to OFF
	B09		ON to OFF
	B10		ON to OFF

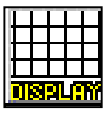
Cam timer : power build-up for heating elements of a boiler.
Logic diagram (version 2).

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	On button	
	I02	Off button	
	I03	System initialization	
	I04		
	I05		
	I06		
	O01	S1 : 1st heating element	
	O02	S2 : 2nd heating element	
	O03	S3 : 3rd heating element	
	O04	S4 : 4th heating element	
	B01	Bistable memory activating/deactivating heating element S4	Prior = RESET

Cam timer : power build-up for heating elements of a boiler.
Information on the function blocks (version 2).

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B02	Bistable memory activating/deactivating heating element S2	Prior = RESET
	B03	Bistable memory activating/deactivating heating element S3	Prior = RESET
	B04	Counting of pulses allowing the heating elements to be activated or deactivated	Count ### / 6
	B05	Block allowing deactivation of S3	B04 : ActCount = 4
	B06	Block allowing deactivation of S2	B04 : ActCount = 4
	B07	Block allowing deactivation of S4	B04 : ActCount = 6
	B08	Single time delay “T” modifiable directly from the Millenium keys	OneShotTime : ### / 20 OutputClearCond : None
	B09		OFF to ON
	B10	Block allowing activation of S2	B04 : ActCount = 1
	B11	Block allowing activation of S3	B04 : ActCount = 2
	B12	Block allowing activation of S4	B04 : ActCount = 3

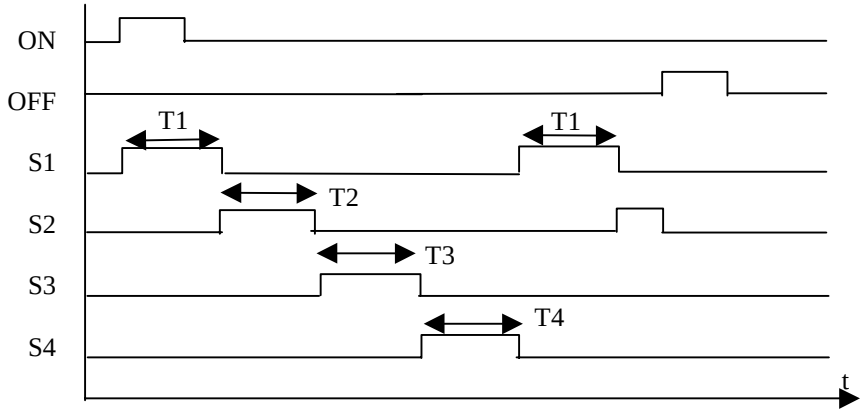
Cam timer : power build-up for heating elements of a boiler.
Information on the function blocks (version 2).

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B13		ON to OFF OFF to ON
	B14		ON to OFF OFF to ON
	B15		ON to OFF OFF to ON
	B16	Display of the time delay. The ticked “Special Key” option allows its value to be modified	Position X = 5 Y = 3 Input = OneShot(B08) Special Key = Enable
	B17	Permanent text display	X = 1 Y = 1, Text = Delay Val=
	B18		
	B19		ON to OFF
	B20	Bistable memory activating/deactivating heating element S1	Prior = RESET
	B21		
	B22		
	B23		
	B24		
	B25		
	M01	Internal bit. Forcing to 1	

Example 8 : Cam timer : cycle of 4 successive phases (industrial washing machine). (File : **CamesN1** and **CamesN2**)

Specification :

The object is to implement an adjustable cam timer performing, in "on" mode, cycles of 4 successive phases. Action on the stop button stops the process immediately. The four phases will be, for example,: pre-wash, wash, dry, wait.
The timing diagram below describes the operation of the system.



An "On" button (ON) enables the start of the cycle. The output S1 is activated during T1, then the output S2 during T2, then the output S3 during T3, then the output S4 during T4.
Action on the "Off" button (OFF) stops the cycle in progress.

Input/output table :

INPUTS		OUTPUTS	
I01	On button	**O01**	First phase S1
I02	Off button	**O02**	Second phase S2
		O03	Third phase S3
		O04	Fourth phase S4

Model required :

6 input/4 output Millenium :
MAS-10-RCA (100-240 VAC).
MAS-10-RCD (24 VDC).

Program description :

Two levels of programming are proposed.
Level 1 : The various time delays cannot be modified from the Millenium.
Level *2* : The user can modify the four time delays directly from keys on the front of the Millenium.

The display appears as follows :

```
T1=   120.0
T2=    60.0
T3=    65.0
T4=   120.0
```

The times displayed are in seconds.

The procedure for modifying the time delays is as follows :

➔Press any key on the front.

➔Use the "▲" or "▼" keys to select the value to be modified.

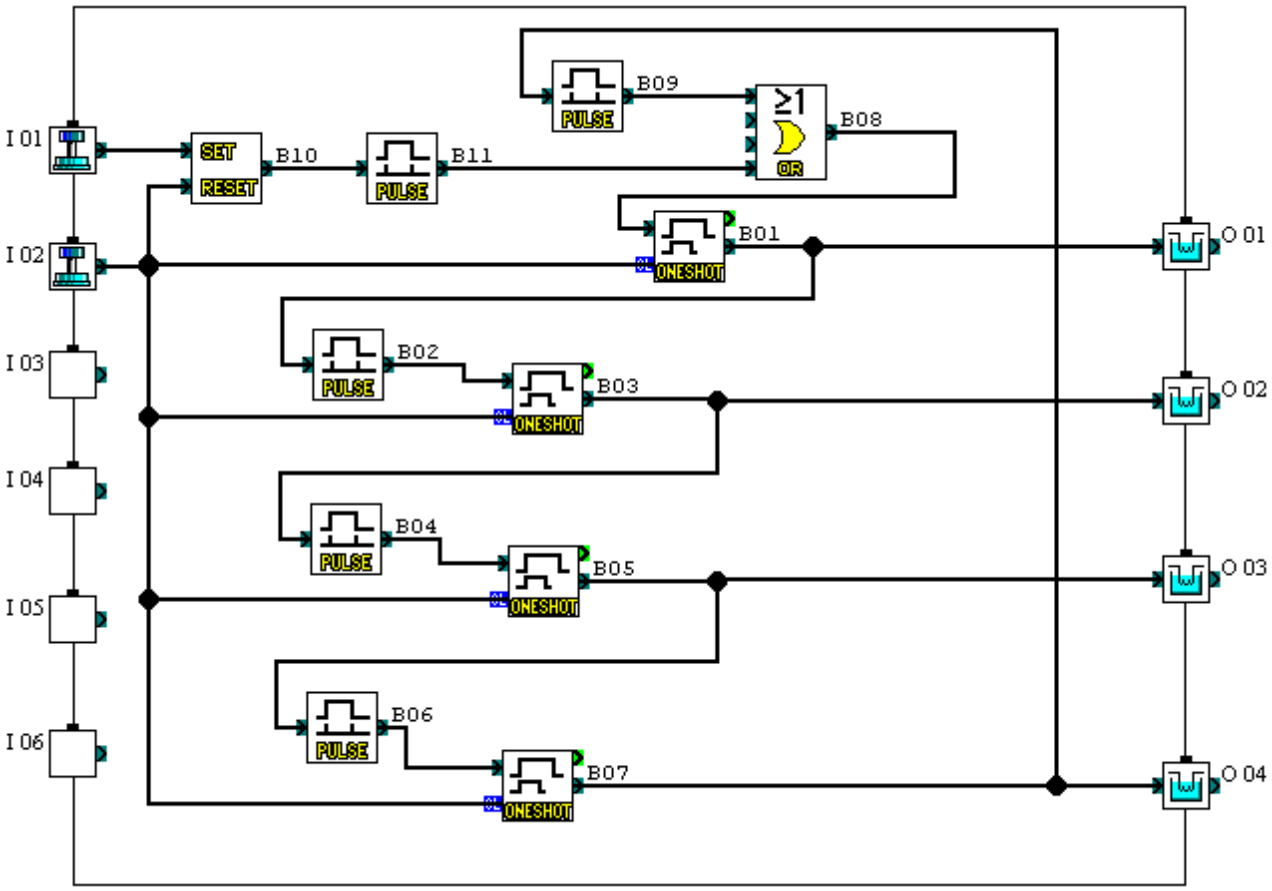
➔Use the "+" or "-" keys to change the value.

➔Confirm your entry by pressing "OK", or cancel with "ESC" (the effect of this is to recall the last value entered).

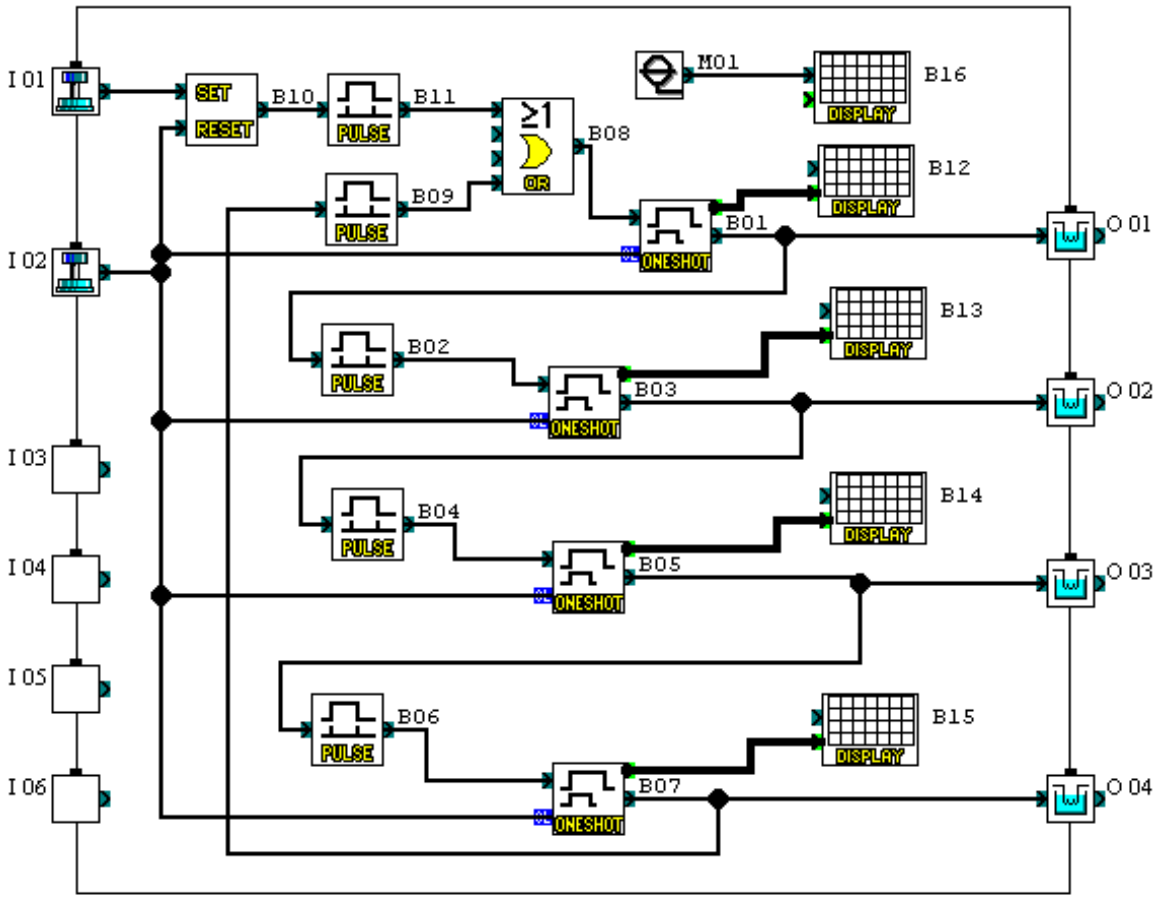
Strong points of the application :

Level 2 allows simple changes in the settings of the time delay parameters using the keys on the front of the module.

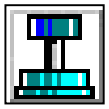
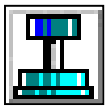
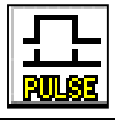
Cam timer : cycle of four successive phases.
Logic diagram (level 1) (camesn1).



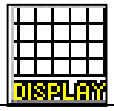
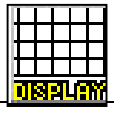
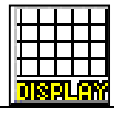
Cam timer : cycle of four successive phases.
Logic diagram (level 2) (camesn2).



Cam timer : cycle of four successive phases.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	Cycle start button	
	I02	Cycle stop button	
	I03		
	I04		
	I05		
	I06		
	O01	Output 1	
	O02	Output 2	
	O03	Output 3	
	O04	Output 4	
	B01	Output 1 time delay	OneShotTime : ### / 1200 OutputClearCond : None
	B02	Activation of time delay T2	ON to OFF
	B03	Output 2 time delay	OneShotTime : ### /600 OutputClearCond : None
	B04	Activation of time delay T3	ON to OFF

Cam timer : cycle of four successive phases.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B05	Output 3 time delay	OneShotTime : ### / 650 OutputClearCond : None
	B06	Activation of time delay T3	ON to OFF
	B07	Output 4 time delay	OneShotTime : ### / 1200 OutputClearCond : None
	B08		
	B09	Activation of time delay T1 for starting a new cycle	ON to OFF
	B10	Bistable memory	Prior = RESET
	B11		OFF to ON
	B12	T1 display	Position X = 5 Y = 1 Input = OneShot(B01) Special Key = Enable
	B13	T2 display	Position X = 5 Y = 2 Input = OneShot(B03) Special Key = Enable
	B14	T3 display	Position X = 5 Y = 3 Input = OneShot(B05) Special Key = Enable
	B15	T4 display	Position X = 5 Y = 4 Input = OneShot(B07) Special Key = Enable
	B16	Text display	Position X = 1 Y = 1 Text = T1= T2= T3= T4=
	M01	Internal bit. Forcing to 1	

Example 9 : Watering the garden – zone management.
(File : **arrosage**)

Specification :

The object is to water four zones of ground automatically, every day at 6am and 11pm.
A Crouzet liquid level relay (type EN) equipped with two electrodes prevents watering if the soil is sufficiently damp (adjustable detection sensitivity). Otherwise, watering is dependent upon a pressure probe placed in the water reservoir.
Insufficient pressure : the four zones are watered in turn (10 minutes zone 1, then 10 minutes zone 2, then 10 minutes zone 3, then 10 minutes zone 4, then 10 minutes zone 1 again, etc). Three watering cycles over the whole ground are therefore carried out.
Sufficient pressure : the four zones are watered simultaneously for 30 minutes, in cycles of 10 minutes watering and 10 minutes rest for the water to soak in.

Input/output table :

INPUTS		OUTPUTS	
I01	Humidity probe	**O01**	Zone 1 watering
I02	Pressure probe	**O02**	Zone 2 watering
I03	Zone 1 forced watering	**O03**	Zone 3 watering
I04	Zone 2 forced watering	**O04**	Zone 4 watering
I05	Zone 3 forced watering		
I06	Zone 4 forced watering		

Model required :

6 input/4 output Millenium:
MAS-10-RCA (100-240 VAC).
MAS-10-RCD (24 VDC).

Program description :

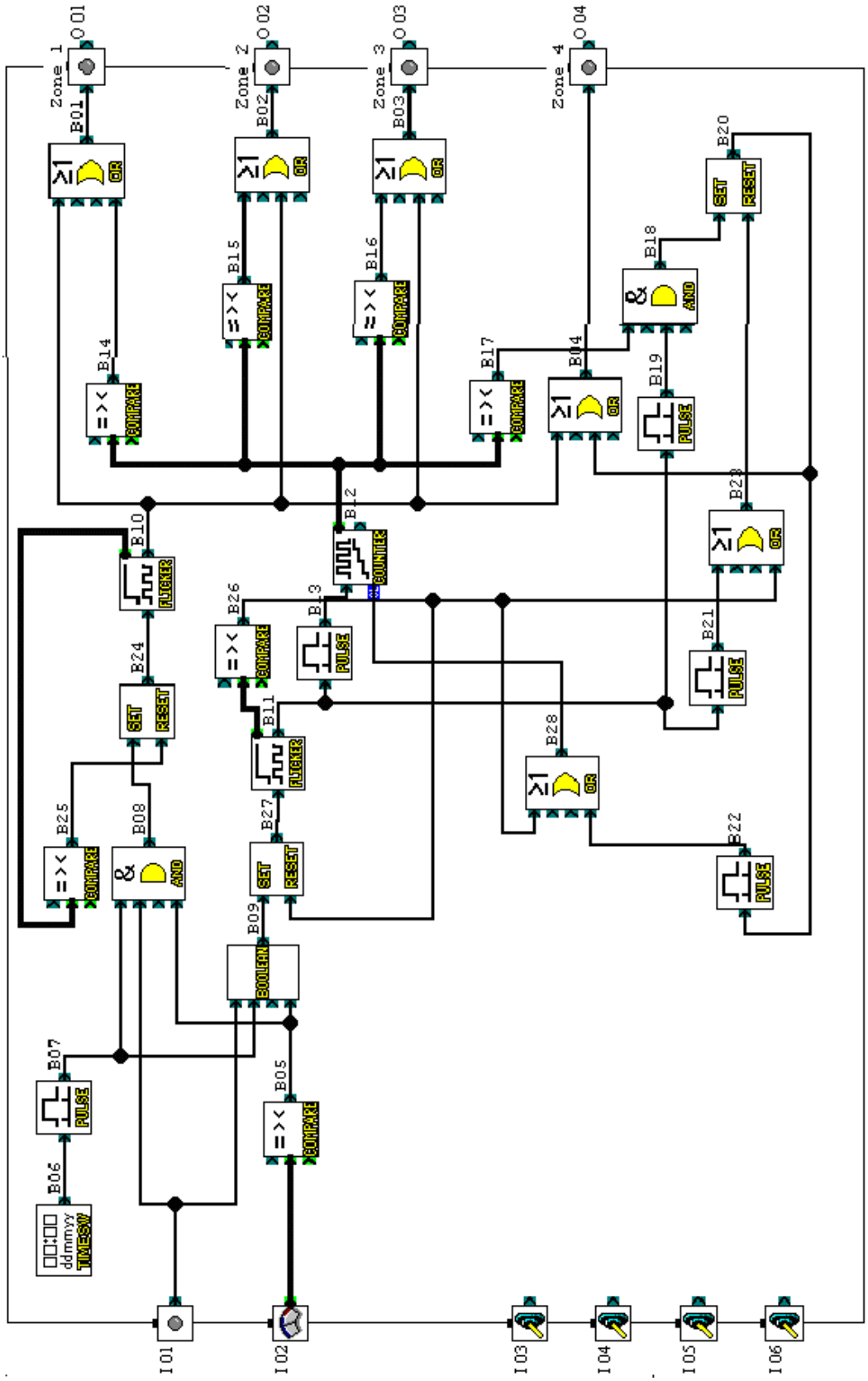
Activation of watering of the zones is dependent upon the **FLICKER** function block. This block is defined by specifying the duration and number of watering cycles ("Cycle count" option to be ticked).
The threshold value defined in the **COMPARE** block (B05) is arbitrary and depends on your installation (characteristics of the probe, pump, etc.).
The output of the liquid level relay is used as a digital input.

A second logic diagram shows the other four inputs to be connected (forced operation for each zone), in order to avoid clutter, and clarify the program.
Pulses given by the inputs I03, I04, I05, I06 force the watering of zones 1, 2, 3 and 4 respectively, for 10 minutes.

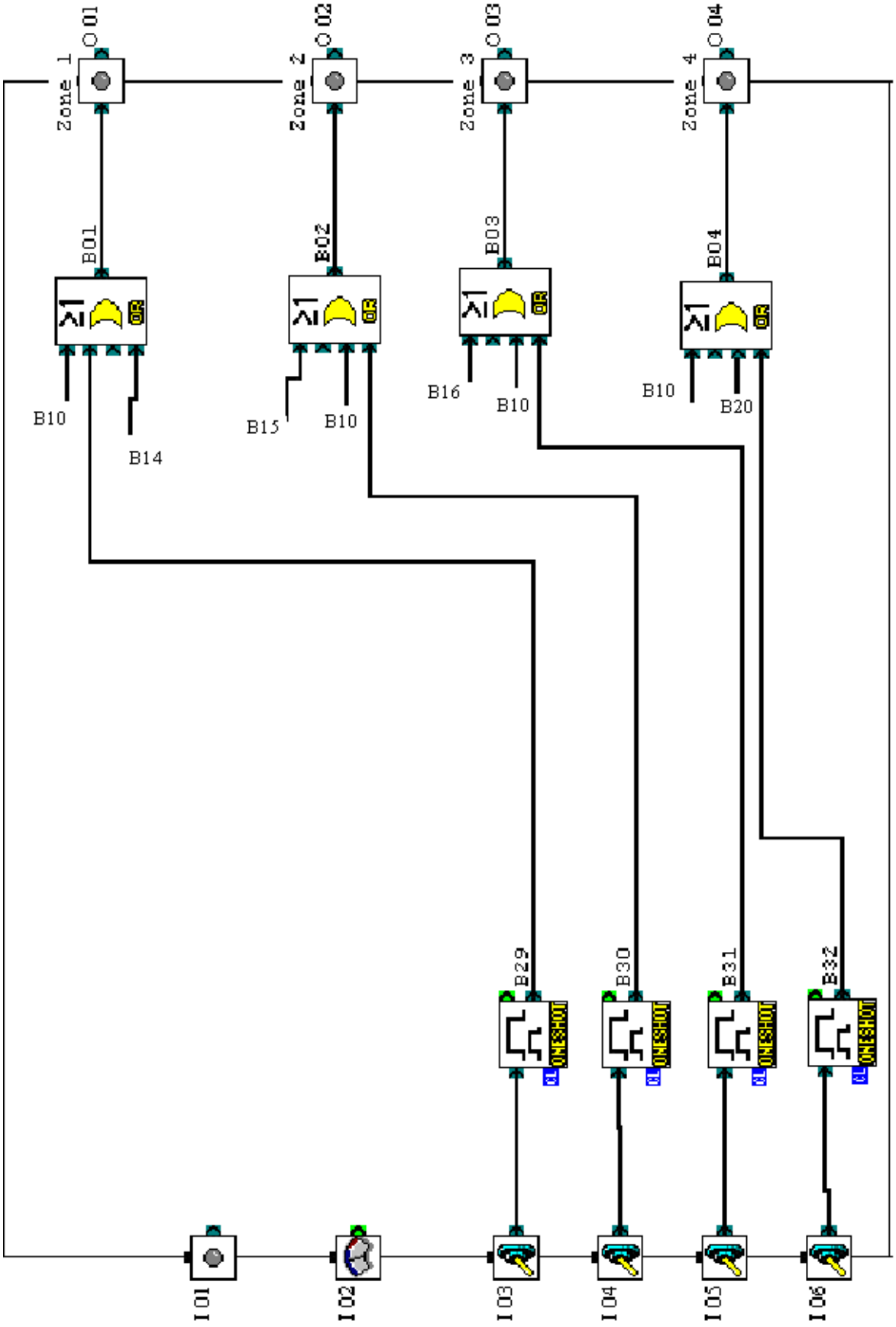
Strong points of the application :

For each watering mode, simultaneous or successive, modification of the time delays is carried out on a single block, and not on one block per zone.

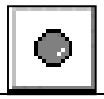
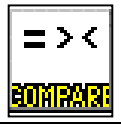
Watering the garden – zone management.
Logic diagram (arrosage).



Watering the garden – zone management.
Logic diagram (continued).



Watering the garden – zone management.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	Level monitoring relay output : digital	
	I02	Tank pressure	
	I03	Zone 1 forced watering	
	I04	Zone 2 forced watering	
	I05	Zone 3 forced watering	
	I06	Zone 4 forced watering	
	O01	Zone 1	
	O02	Zone 2	
	O03	Zone 3	
	O04	Zone 4	
	B01		
	B02		
	B03		
	B04		
	B05	Watering simultaneously or in rotation	I02 : SigAnalogVal >= 150
	B06	Watering activation clock	ON 6:00 Daily Weekly OFF 6:01 Daily Weekly ON 23:00 Daily Weekly OFF 23:01 Daily Weekly

Watering the garden– zone management.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B07		OFF to ON
	B08		
	B09	Logic equation	B09=I01 AND NOT B05 AND B07
	B10	Simultaneous watering cycles	ONTime : ### / 20 OFFTime : ### / 50 Option : Cycle ### / 4
	B11	Zone rotation	ONTime : ### / 6000 OFFTime : ### / 6000 Option : Cycle ### / 7
	B12	Cycle counting	Count : ### / 4
	B13		ON to OFF OFF to ON
	B14	Condition for activating zone 1	B12 : ActCount = 1
	B15	Condition for activating zone 2	B12 : ActCount = 2
	B16	Condition for activating zone 3	B12 : ActCount = 3
	B17	Condition for activating zone 4	B12 : ActCount = 4
	B18		
	B19		ON to OFF
	B20		Prior = RESET
	B21		OFF to ON
	B22		OFF to ON

Watering the garden– zone management.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B23		
	B24		Prior = RESET
	B25		B10 : ActCycleOrTime = 4
	B26		B10 : ActCycleOrTime = 7
	B27		Prior = RESET
	B28		
	B29	Forced operation for zone 1 watering (10 minutes)	OneShotTime : ### / 6000 OutputClearCond : None
	B30	Forced operation for zone 2 watering (10 minutes)	OneShotTime : ### / 6000 OutputClearCond : None
	B31	Forced operation for zone 3 watering (10 minutes)	OneShotTime : ### / 6000 OutputClearCond : None
	B32	Forced operation for zone 4 watering (10 minutes)	OneShotTime : ### / 6000 OutputClearCond : None

Example 10 : Controlling the number of starts of a standby power unit.
(File : **groupsec**)

Specification :

When a mains failure occurs, the object is to control, during a time T1, the number of starts of a Diesel standby power unit supplying a generator. The starts are counted and limited to N=3. Any new start is then prevented for a time T2 (1 minute) (activated if N is reached or if T1 (3 minutes) ends).

The signal from a tachometer (a function undertaken by Crouzet Type 4192 multifunction counters) placed at the generator makes it possible to verify that the standby power unit is working correctly. At each start pulse, a time delay of 10 seconds is activated. If the start fails at the end of this time, a new pulse is sent.

The unit can be powered manually, and the device initialized by another input.

Input/output table :

INPUTS		OUTPUTS	
I01	Mains	**O01**	Standby power unit supply
I02	Tachometer (checking the rotation of the generator)	**O02**	Indicator light (failure)
I03	Forced operation of the standby power unit		
I04	System initialization		

Model required :

4 input/2 output Millenium:
MAS-6-RCA (100-240 VAC)

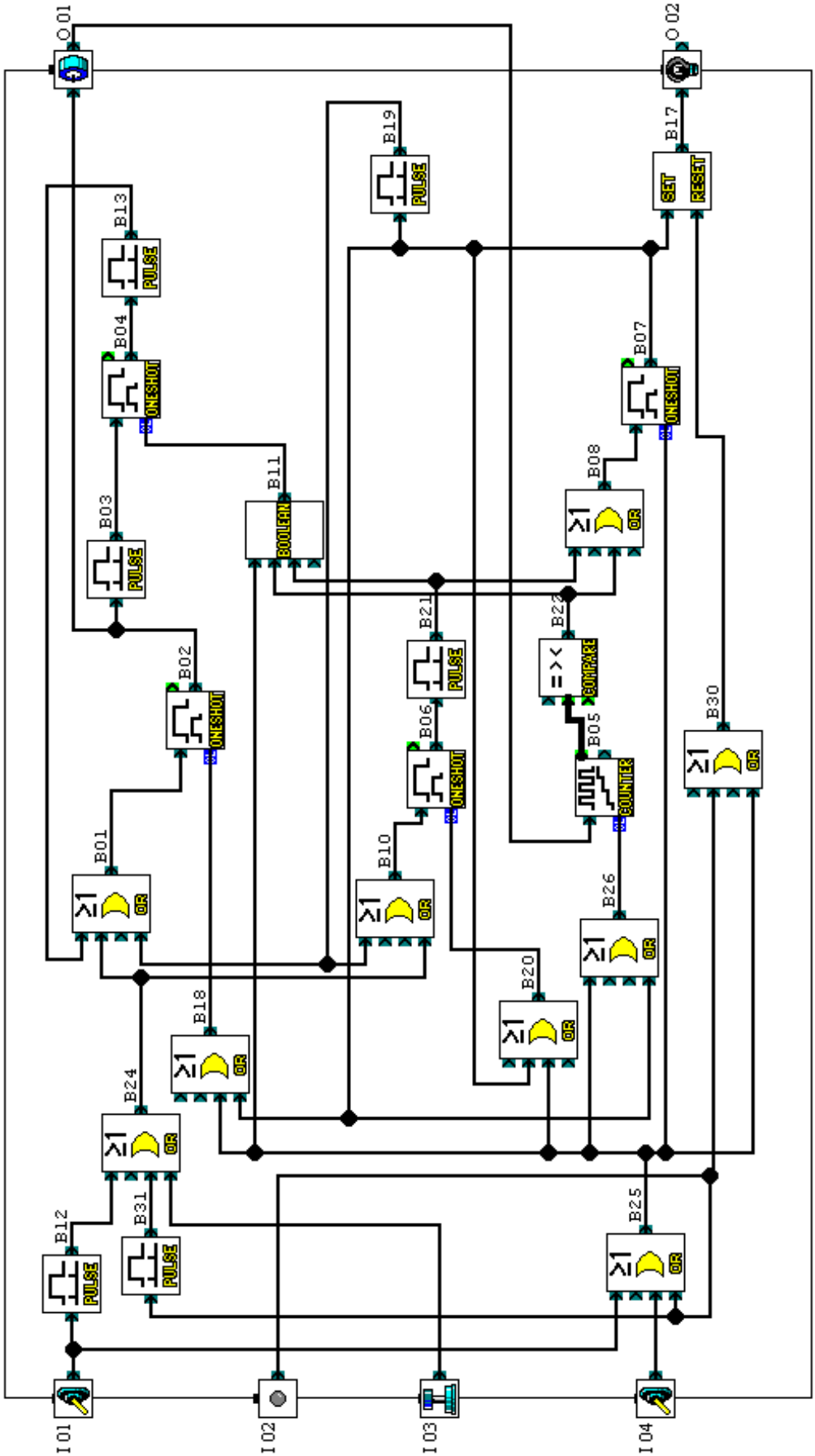
Program description :

If, during 10 seconds after the mains failure (I01), no signal from the tachometer (I02) has been detected, a new start is initiated (O01). If a fourth start is necessary during T1, the time delay T2 is activated.
The indicator light signalling a failure to start is activated if T2 is at logic state 1. It is deactivated either if the tachometer sends back a signal, or if the mains returns, or if the system is initialized.

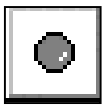
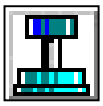
Strong points of the application :

The “counter” function, associated with the time delay functions, make this application simple to implement from a single automation control module.

Controlling the number of starts of a standby power unit.
Logic diagram (groupsec).



Controlling the number of starts of a standby power unit.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	I01	Mains	
	I02	Tachometer. Evidence of activation of the standby power unit	
	I03	Forced operation	
	I04	Initialization	
	O01	Standby unit power supply	
	O02	Failure	
	B01		B01=B13 OR B24 OR B19
	B02	Pulse activating the standby power unit starter device	OneShotTime : ### / 5 OutputClearCond : None
	B03		OFF to ON
	B04	Time between two starts	OneShotTime : ### / 100 OutputClearCond : None
	B05	Counting of starts during T1	Count ### / 32767
	B06	Time T1 during which the number of starts is tested (3 minutes)	OneShotTime : ### / 1800 OutputClearCond : None
	B07	Time T2 preventing any start (1 minute)	OneShotTime : ### / 600 OutputClearCond : None

Controlling the number of starts of a standby power unit.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B08	Boolean block defined as an OR function	B08=B21 OR B22
	B10	Boolean block defined as an OR function	B10=B19 OR B24
	B11	Boolean block defined as an OR function	B11=B22 OR B21 OR B25
	B12		ON to OFF
	B13		ON to OFF
	B17		Prior = RESET
	B18	Boolean block defined as an OR function	B18=B25 OR B07
	B19		ON to OFF
	B20		B20=B07 OR B25
	B21		ON to OFF
	B22		B05 : ActCount = 4
	B24		
	B25		

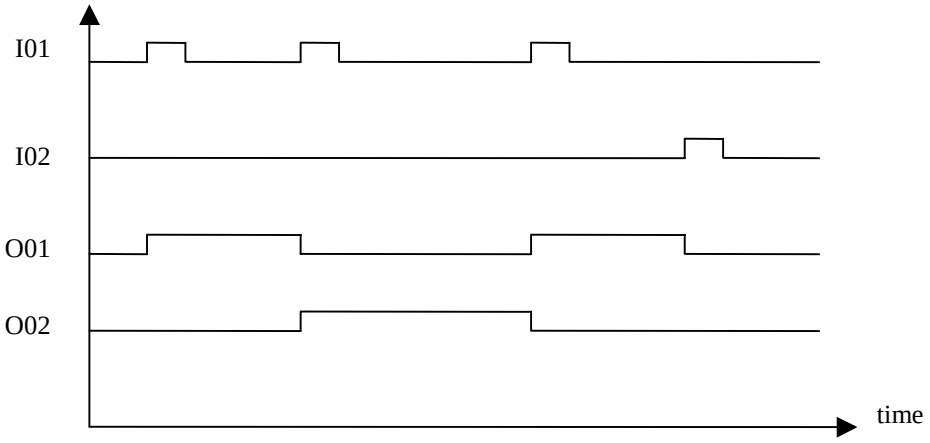
Controlling the number of starts of a standby power unit.
Information on the function blocks.

ICON	BLOCK NUMBER	COMMENTS	PARAMETERS
	B26		
	B30		
	B31		ON to OFF

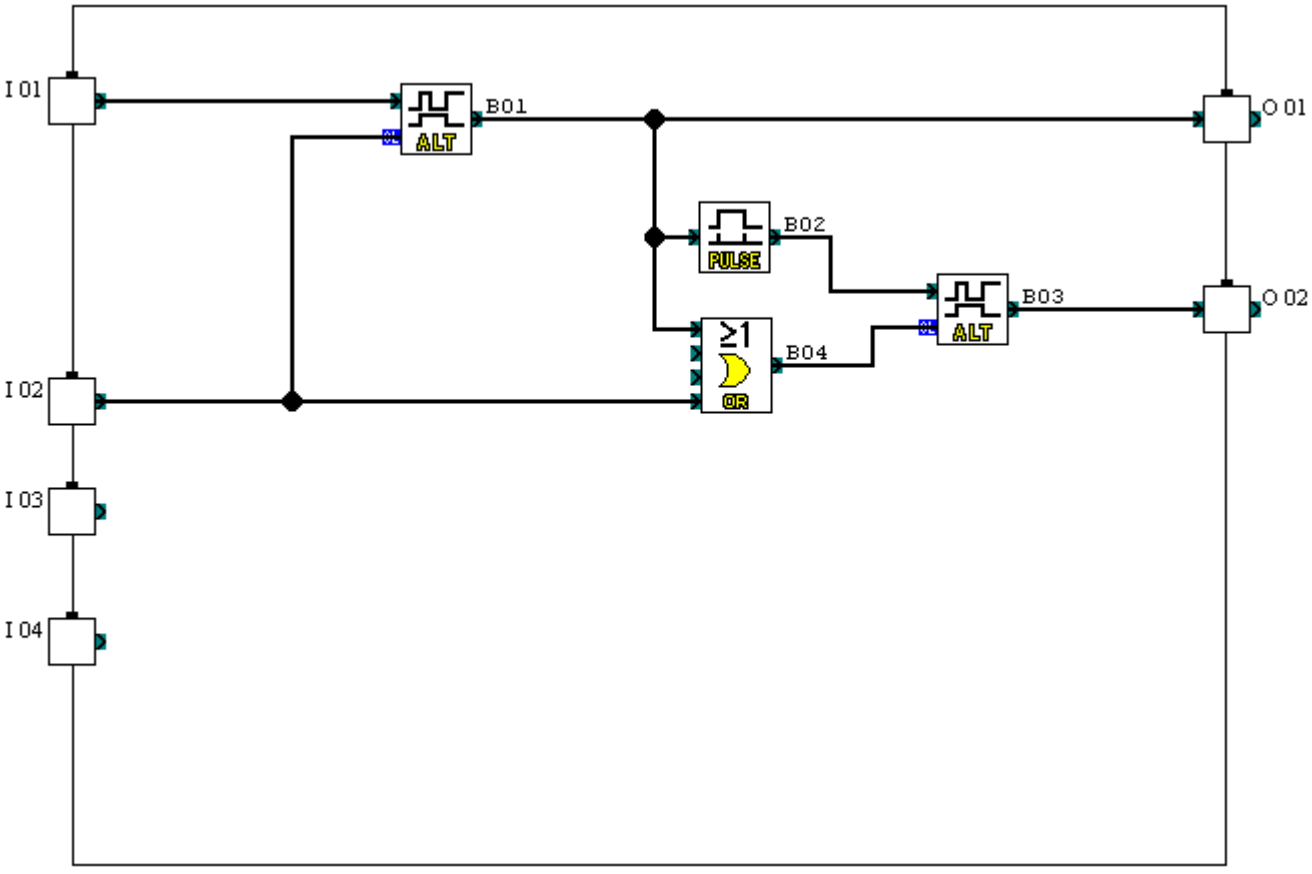
Alternate activation of two elements I

(File : **Maralt-1**)

➜*Inputs* : 1 start button (I01) ; 1 initialization button (I02).
➜*Outputs* : (O01) ; (O02).
➜*Operation* : On power-up, no output is activated. A first operation on I01 activates output O01. A second operation on I01 deactivates O01 and activates output O02. A new operation on I01 restarts the cycle.



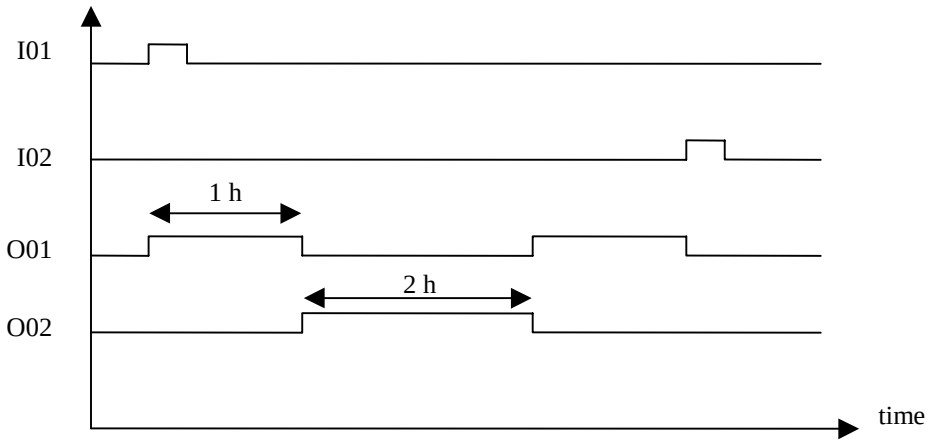
➜*Diagram* : Parameter definition of the **PULSE** block : “From On to Off”.



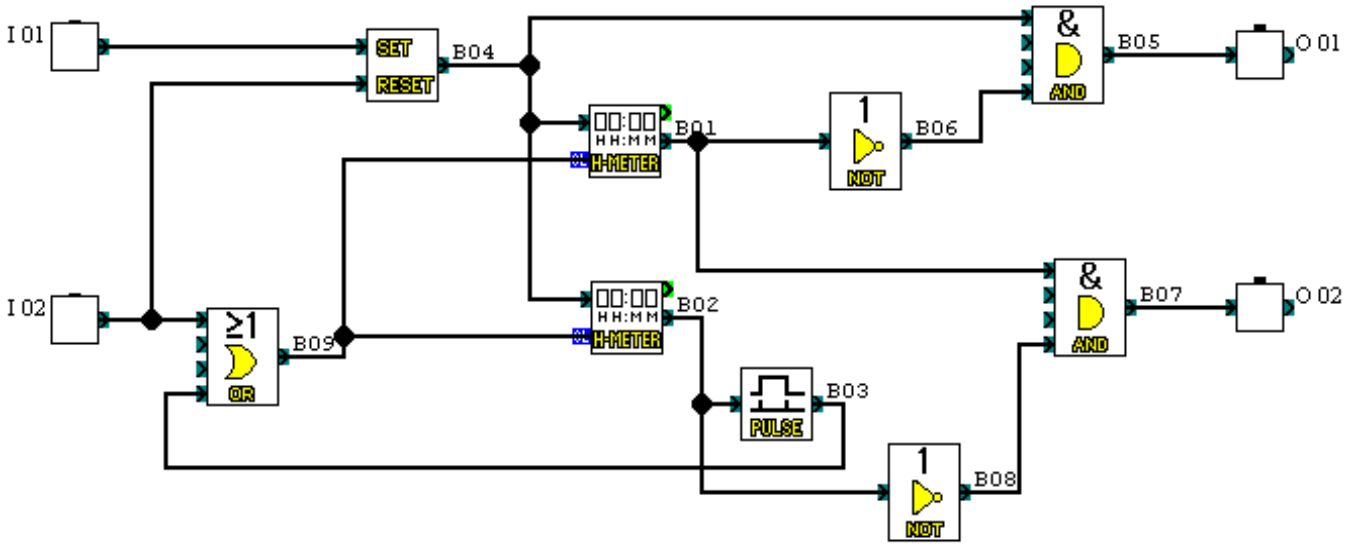
Alternate activation of two elements II

(File : **Maralt-2**)

➜*Inputs* : 1 start button (I01) ; 1 stop button (I02).
➜*Outputs* : 2 outputs (O01 and O02).
➜*Operation* : On power-up, no output is activated. Unlike the previous example, alternate activation of the outputs is no longer dependent upon an action on the input, but upon a time delay. An action on I01 (a pulse) activates the output O01 for 1 hour. At the end of this time, the output O02 takes over for 2 hours. The cycle continues in this way until a pulse signal (I02) brings it to an end.



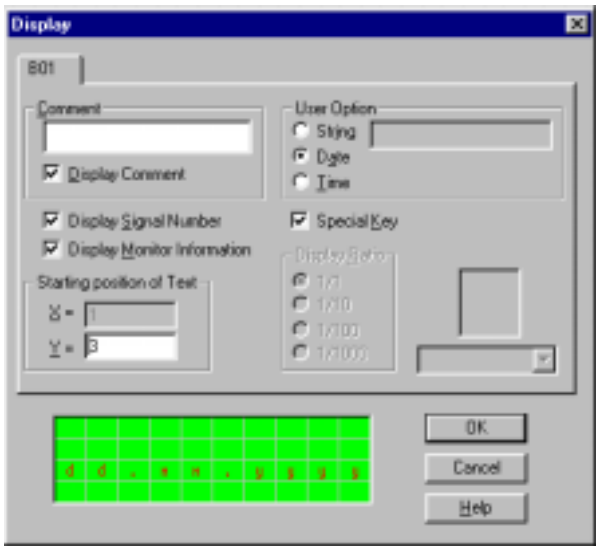
➜*Diagram* : Parameter definition of the **PULSE** block : “From Off to On ”.
Parameter definition of the **H-METER** block (B01) : Hour=**1** ; Minute=**0**. This block defines the activation time of O01 during one cycle.
Parameter definition of the **H-METER** block (B02) : Hour=**3** ; Minute=**0**. This block defines the total time of one cycle. **3** hours – **1** hour = **2** hours on for O02.

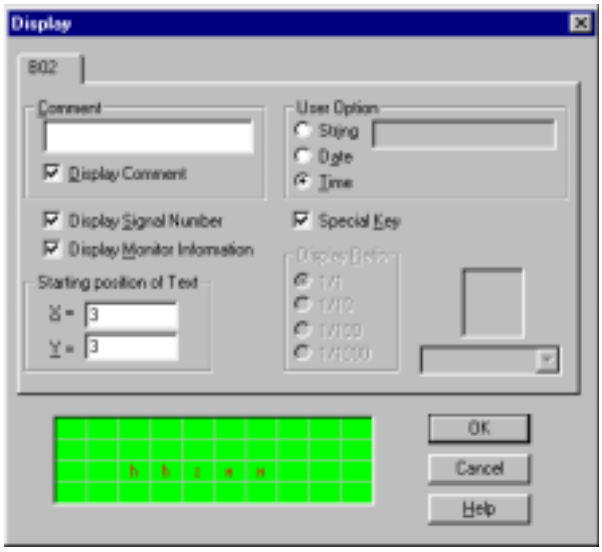


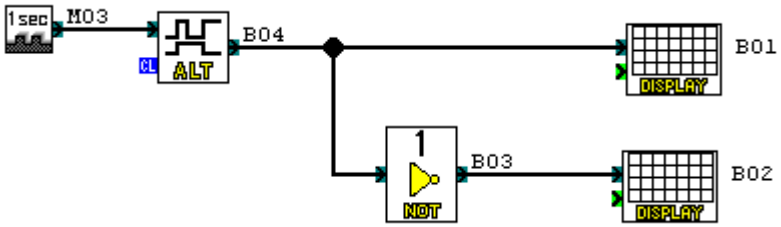
Date and time flashing display.

(File : **DateHeur**)

➜*Inputs* : none.
➜*Outputs* : none.
➜*Operation* : The Millenium screen alternately displays the date and time on the same line.
➜*Diagram* : Parameter definition of the **DISPLAY** blocks (B01 and B02) **:**

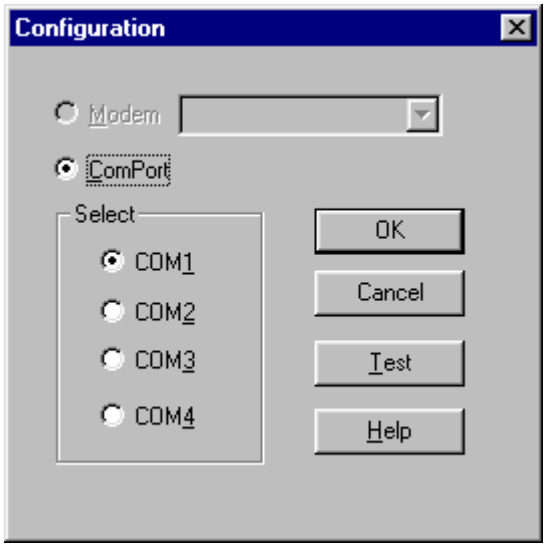






Transfer of a program from the PC to the Millenium.

➜Once the program has been completed using C.L.S. (Crouzet Logic Software), connect the Millenium to the PC via the connecting lead.
➜In the "**Com**" drop-down menu, select the "**Configuration**" option in order to specify the communication port. The following dialogue box appears :



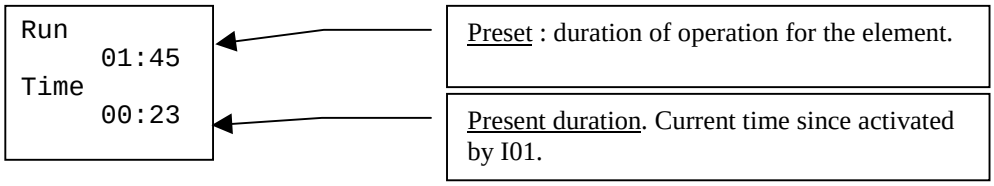
➜Press the "**Write to Controller"** icon or, from the "**Controller**" drop-down menu, select the "**Write to Controller**" option.

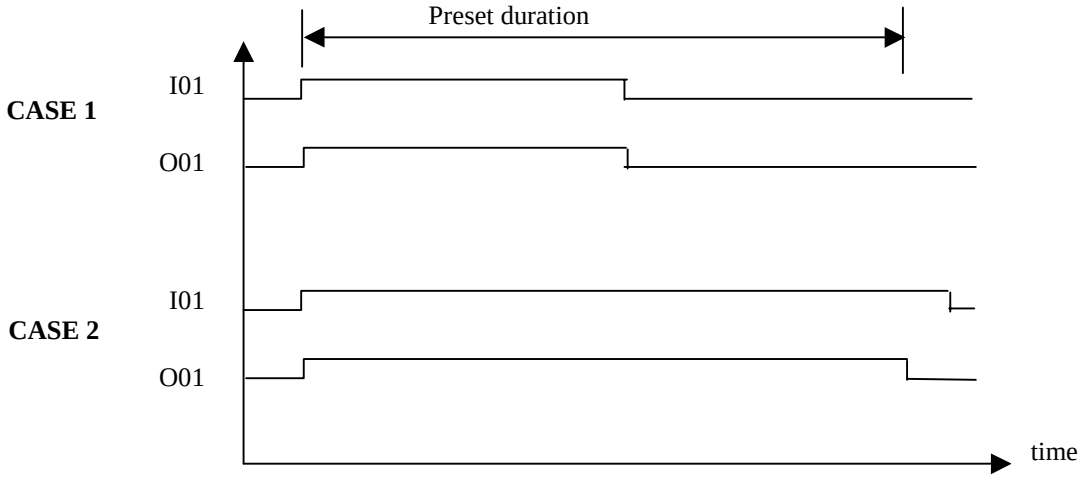
➜A message confirms the transfer.

Activation time of an element in hours/minutes.

(File : **PilotHM**)

➜*Inputs* : 1 on/off button (I01).
➜*Outputs* : 1 output (O01).
➜*Operation* : The Millenium screen displays an adjustable time in hours/minutes defining the switching duration for the output O01, then the current activation time of this same output (figure below). When the input I01 is deactivated, the current time is reset to zero.

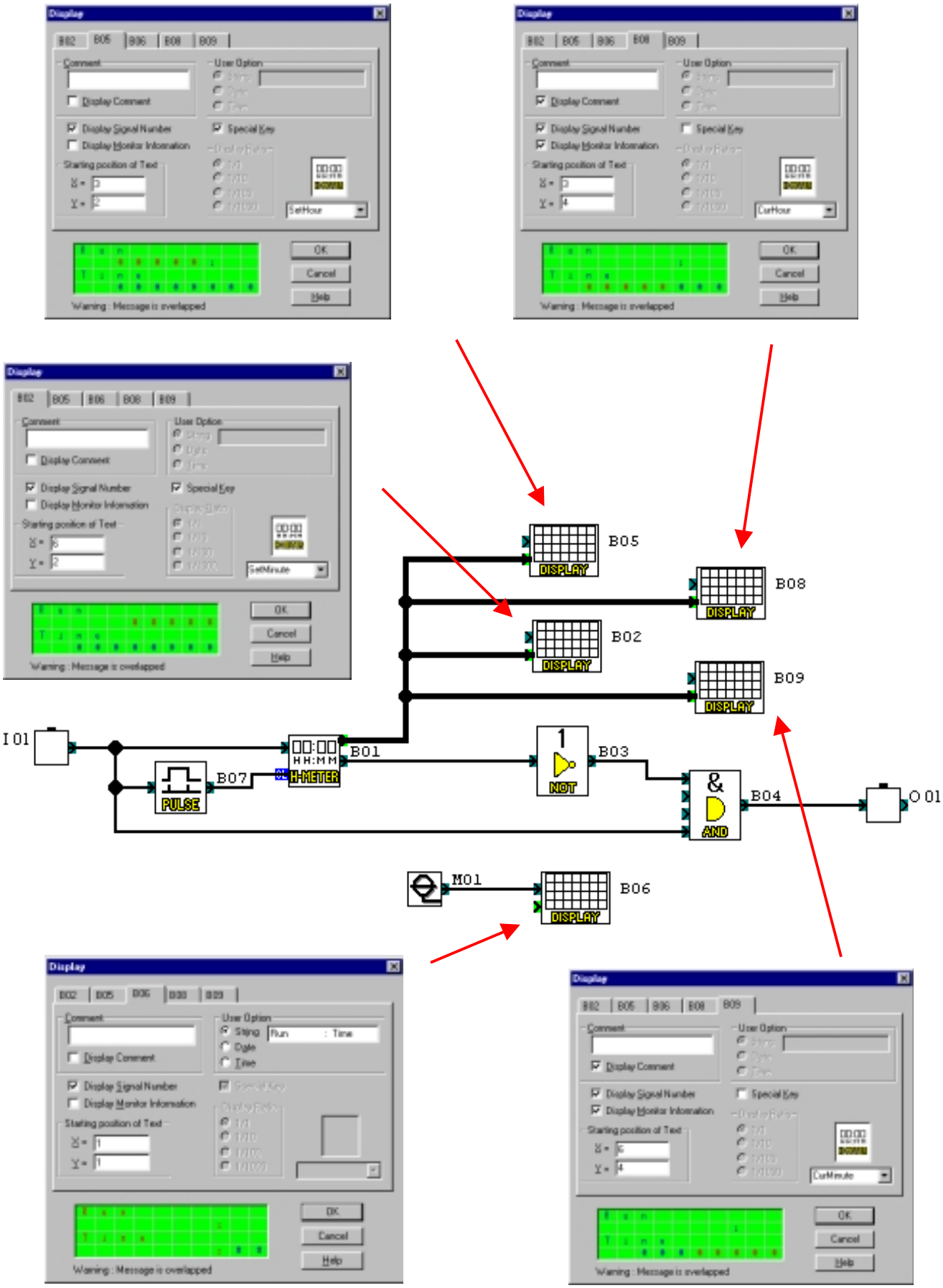




The preset can be modified, from the Millenium keys, before or during program execution. The procedure is as follows :

➜Press one of the keys on the front (either the hours or the minutes digit flashes).
➜Use "+" or "-" to increase or decrease the value.
➜Press "OK" to confirm the entry or "ESC" to cancel.
➜Proceed in the same way with the hours or the minutes digit, accessing it with the "▲" or "▼" keys.

➜*Diagram* : Parameter definition of the various blocks.



The **PULSE** block (B07) is defined so as to send a pulse signal at the output as soon as the input signal changes "**From ON to OFF**". This function will allow the current time to be initialized as soon as I01 is deactivated.

The **HOUR-METER** block (B01) preset is arbitrarily fixed at "**1 hr 45 min**".

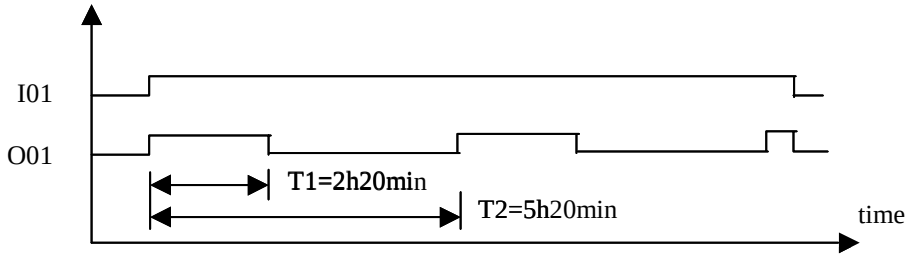
The **DISPLAY** blocks (B02 and B05) display the preset values for the hours (**SetHour**) and the minutes (**SetMinute**). The fact of ticking the "**Special Key**" option will allow the user to modify these values as he wishes.

The **DISPLAY** blocks (B08 and B09) display the current values of the hours (**CurHour**) and minutes (**CurMinute**). The "**Special Key**" option is not ticked for these two blocks, which prevents access to them.

FLICKER function in hours/minutes.

(File : **FlicHM**)

➜*Inputs* : 1 start/stop button (I01).
➜*Outputs* : 1 output (O01).
➜*Operation* : An action on I01 (rising edge) activates the output O01 for 2 hours 20 minutes, then deactivates it for 3 hours. Once the first cycle is finished, a new one starts. A second action on I01 (falling edge) stops the process.



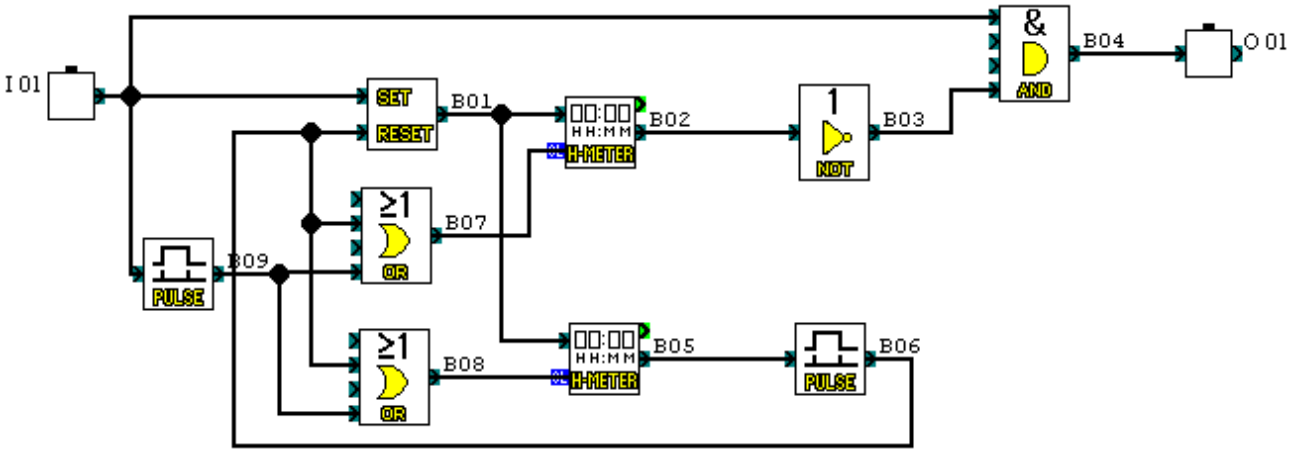
➜*Diagram* : Parameter definition of the blocks.

PULSE (B06) : “From On to Off”. This function block allows a new cycle to be started as soon as one finishes.

PULSE (B09) : “From On to Off”. This function block allows a reset to zero of the H-METER functions.

H-METER (B02) : Hour=**2** ; Minutes=**20**. This block defines the activation time T1 in a cycle.

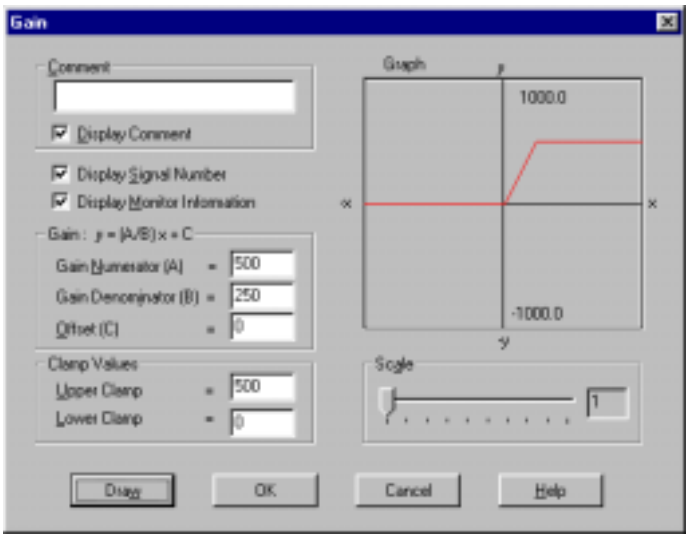
H-METER (B05) : Hour=**5** ; Minutes=**20**. This block defines the time T2 of a cycle. The duration defined here dictates 3 hours off in a cycle (5hr 20min – 2hr 20min = 3hr).



Display of a temperature to a tenth of a degree.

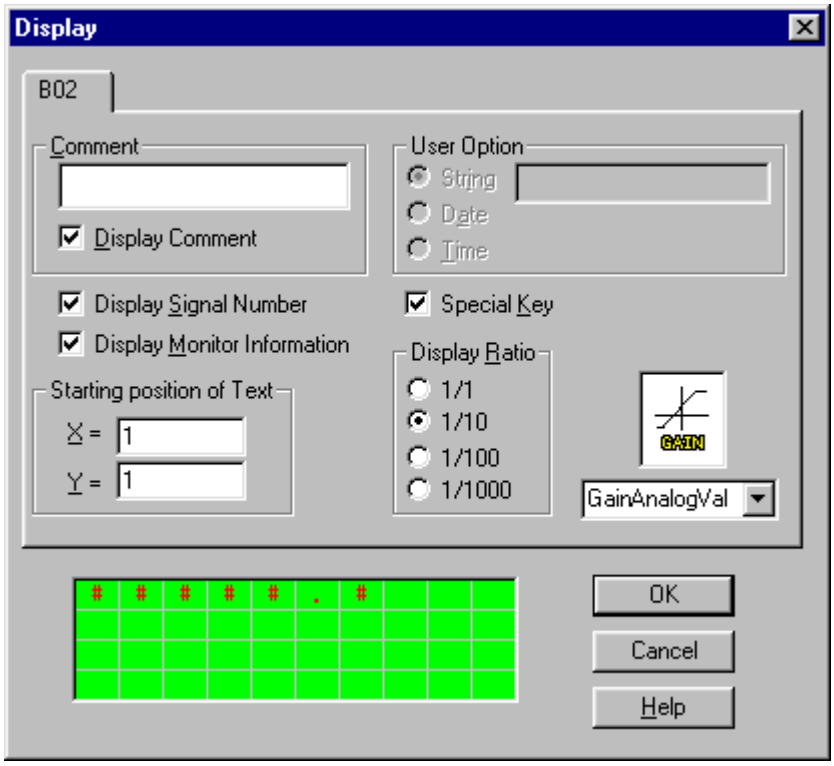
(File : **DixDegre**)

➜*Inputs* : 1 analogue input (I01).
➜*Outputs* : None.
➜*Operation* : A 0-10V converter, connected to a temperature probe (0-50°C), makes it possible to display the temperature of a room to a tenth of a degree on the Millenium screen.
➜*Diagram* : Parameter definition of the **GAIN** block (B01) :



➜The number A (Gain numerator) corresponds to the temperature range under consideration multiplied by ten : **A =(** max ***temp value*** **–** min ***temp value*****)*10** ➜The number B (Gain denominator) corresponds to the maximum numerical value available on the Millenium (8-bit coding). In the majority of cases to be dealt with, this value is not modified. ➜The number C (FB offset) corresponds to the offset which should be applied to display a negative temperature. It is therefore an offset from zero. **C =(*zerooffset*)*10**	Writing of the equation for converting the numerical value to temperature in °C. Y = (A/B) X + C Y : Temp.(°C) X : Numerical value (0-250), the resolution is : 10000/250
➜The value of the Upper Bound determines the maximum value reached. No temperature above this value can be displayed. **UB =(**max ***desiredvalue*****)*10** ➜The value of the Lower Bound determines the minimum value reached. No temperature below this value can be displayed. **LB =(**min ***desiredvalue*****)*10** The fact of multiplying all the values (except B) by 10 makes it possible to handle an additional digit which should be placed after the decimal point.	

Parameter definition of the **DISPLAY** block (B02) :



The choice of displaying the value, converted at the output of the **GAIN** block, with one digit after the decimal point is made by ticking the "**1/10**" option in the "**Display Ratio**" area.

The diagram appears as follows :